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Journal
OF THE
Gujarat Research Society

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(2) To collect and publish accurate information on all subjects relating to Gujarat, Kathiawar and Cutch.

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પૂજ્ય બાપુજીને નિવાપાંજલિ

પૂજ્ય બાપુજીના ખેદજનક અવસાનની નોંધ લેતાં એમના મૃત્યુને આજ દોઢ મહિનો થયો છતાંયે કલમ ખચકાય છે. ગાંધીજી જેવા કાર્યસમર્થ પુરૂષની એમનું ગમે ત્યારે અવસાન થાય તો પણ આપણને ઓટ લાગવાની જ, એટલે બાપુજી આજના અવસરે ગુજરી ગયા એનું દુઃખ થાય એ સ્વાભાવિક છે. પરંતુ જેમણે વિશ્વના કોઇપણ માનવી પ્રત્યે જરાપણ દ્વેષ કે ધિક્કાર સેવ્યો નથી એમનું ખૂન થાય એ સકળ માનવજાતને નીચું જોવડાવનારૂં છે. આમ જગતને એક ગણતા હોવા છતાં હિંદને પોતાની કાર્યભૂમિ બનાવી એના સામાજિક, રાજકીય અને નૈતિક જીવનમાં નવો પ્રાણ ફૂંકનાર મહાત્માજીની હિંદનાજ એક રહેવાસીએ કશા પણ અંગત ખાર વિના હત્યા કરી એ દરેક હિંદીને સદીઓ સુધી શરમથી નીચું જોવડાવશે.

આમ છતાં ગાંધીજી જેવી મહાવિભૂતિએ હિંદમાં જન્મ લીધો એ અકસ્માતથી હિંદીઓ સૈકા સુધી ગર્વ લેશે. આખા જીવનને સત્યના પ્રયોગ તરીકે ગણનાર અને છતાંયે વ્યવહારૂદૃષ્ટિએ પણ પોતાના જીવનને સફળ બનાવનાર, સારાયે રાજકીય જીવનને નૈતિક ભૂમિકા પરથી નિહાળનાર અને ભગવાન કૃષ્ણચંદ્રની જેમ નિઃશસ્ત્રે મોટામાં મોટા સામ્રાજ્ય જોડે લડી હિંદ જેવા નિવીર્ય અને હતાશ દેશને સ્વતંત્રતા અપાવનાર ગાંધીજી એ એક બહુજ વિરલ વિભૂતિ હતા. સમાજસુધારણા, રાજકીય જીવન, સાહિત્યસેવા, ધર્મ, ફીલસુફી ઇત્યાદિ અનેક ક્ષેત્રમાં એમની સેવા તેમજ સિદ્ધિ એટલી બધી હતી કે એમાંની એક પણ દુનિયાના સામાન્ય માનવીને મહાન બનાવી દે. પણ આ મહાપુરૂષની માપદૃષ્ટિ એટલી વિશાળ હતી કે એમને મન આ સિદ્ધિઓ નજીવી લાગતી. એમને મન તો હિંદને કેટલે અંશે મેં અહિંસક, સત્યપ્રેમી અને રામરાજ્ય જેવું બનાવ્યું એજ એમની સફળતાની ખરી કસોટી હતી; અને આ કસોટીમાં હિંદ ઓછું આવતાં એમને અપાર દુઃખ હતું. એથીજ પંદરમી ઑગસ્ટ ૧૯૪૭ ને દિવસે જ્યારે દરેક હિંદીને વર્ડસ્વર્થની લાગણીઓ સ્ફુરી હતી: "Bliss was it in those days to be alive, but to be young was very heaven." ત્યારે વર્ષો સુધી એ ધન્ય દિનની ચાતકદૃષ્ટિએ રાહ જોનાર અને એ શુભ દિવસને લાવનાર પોતે બંગાળમાં ફરી નિરાશ્રિતો અને અનાથોના આંસુ લૂછવામાં વ્યગ્ર થઇ ગયા હતા. આવી વિભૂતિઓને કોઇ પણ દેશ ભાગ્યેજ જીરવી શકે; કુદરત જાણે એમના પર હાથ ઉગામતાં ખંચકાતી હોય એમ સામાન્ય રીતે એમનો અંત માનવીના હાથે આવે છે, અને કોઇક માનવસર્જેકડાઓ એમના જીવનને ન હતું કરી નાખે છે. ટ્રૉટસ્કીએ લેનિનના મૃત્યુ વખતે કહેલું

1 891.05
J.G.R.S.

વાકય આજે યાદ આવે છે. "કોઇ પણ મૂર્ખ એવી મહાન વિભૂતિને મારી નાખી શકે પણ ધરતીમાતાને એનો સમોવડિયો પેદા કરતાં હજારો વર્ષ નીકળી જશે." અને લેનિન કરતાં મહાત્મા ગાંધીનું સ્થાન સકળ વિશ્વની સદાકાળની મહા વિભૂતિઓમાં અનુપમ રીતે ઉંચુ છે.

પૂજ્ય બાપુજીનું આટલું વિશાળ કાર્યક્ષેત્ર છતાં એમણે પોતાની માતૃભાષા કે પોતાના સાહિત્ય પ્રત્યેનો રસ કદી પણ છોડયો નહોતો. "ઘરના છોકરાં ઘંટી ચાટે અને ઉપાધ્યાયને આટો" એવી એમની નીતિ નહોતી. એમણે ગુજરાતને સાદી, સરળ છતાં ઓજસ્વી અને વેધક એવી ભાષા આપી; ગુજરાતીઓ માટે એમણે જોડણીનો શબ્દકોષ તેમજ પારિભાષિક શબ્દકોષ તૈયાર કરાવ્યા; ગુજરાતને એમણે ગંભીર વિષયોમાં રસ લેતું કર્યું. એ રીતે એ ગુજરાતના યુગ લેખક થયા.

ગુજરાતની, હિંદની અને વિશ્વની સેવાને જ પોતાનું જીવનવ્રત બનાવનાર આજે ગાંધીજી નથી–ઐહિક રૂપમાં તો નથી જ એ આપણે મન મોટા શોકની વાત છે. પણ આપણો ખેદ ખરા હૃદયનો તો ત્યારે જ કહેવાય કે જ્યારે આપણે યથાશક્તિ ગાંધીજીના સિદ્ધાંતોને અમલમાં મૂકવા પ્રયત્ન કરીએ. આપણે અર્થની સેવા કે કીર્તિની આકાંક્ષા બાજુએ મૂકી દેશબંધુઓની સેવાને અને સત્યની શોધને આપણું જીવનવ્રત બનાવીએ તોજ આપણે માટે ગાંધીજીનું જન્મ અને મૃત્યુ સાર્થક લેખાય. આ માર્ગ બહુજ કપરો છે, પરંતુ नायमात्मा बलहीनेन लभ्यः। ઈશ્વર આપણને એ મુશ્કેલ રસ્તે જવાનું સામર્થ્ય આપે.

ગાંધીજીનું સર્વોત્તમ સ્મારક તો તેમણે નિર્માણ કરેલા સર્વોદય અને આત્મોદયના સિદ્ધાંતો ધ્યાનમાં રાખીને આપણે રાષ્ટ્રજીવન અને વ્યક્તિજીવન સુધારી શકીએ એજ છે. એ સિદ્ધાંતો નીચે છાપીને આ સંસ્થા ગાંધીજીના આદર્શનું સંસ્મરણ તાજું રાખવાનો પ્રયત્ન કરે છે.

"આત્મોદય માટે" ચોવીસ સાધન

સત્ય	અદ્વેષ
અહિંસા	ધૈર્ય
બ્રહ્મચર્ય	સ્થિતપ્રજ્ઞત્વ
અસ્વાદ	શિસ્ત તપ
અસ્તેય	વિનય નમ્રતા
અપરિગ્રહ	પ્રમાણિકતા
શરીરશ્રમ	વડીલ આજ્ઞા પાલન
સર્વધર્મ સમભાવ	અનાવેશ
અભય	અનિંદા
સ્વદેશી	તંદુરસ્તી–શૌચ
અસ્પૃશ્યતા નિવારણ	સેવા
વિદ્યા	નિરાભિમાન

"સર્વોદય" માટે રચનાત્મક કાર્યક્રમ

કોમી એકતા	તંદુરસ્તી નિયમ
અસ્પૃશ્યતાનિવારણ	માતૃભાષા પ્રેમ
દારૂબંધી	રાષ્ટ્રભાષા
ખાદી	આર્થિક સમાનતા
ગ્રામોદ્યોગ	કિસાનો
ગ્રામસફાઇ	મજુરો
નવી તાલીમ	આદિવાસીઓ
પ્રૌઢ શિક્ષણ	રકતપિત્તીઓ
સ્ત્રીઉન્નતિ	વિદ્યાર્થી

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SEROLOGICAL STATUS OF CASTES AND TRIBES OF CULTURAL GUJARAT

By

D. N. MAJUMDAR AND K. KISHEN

At the invitation of the Gujarat Research Society in 1946, we undertook a racial and serological survey of Gujarat, Kathiawar and Cutch. The two previous racial surveys, one in the United Provinces carried out in 1941-43 under the auspices of the Provincial Census Operations, 1941, and financed by the Central Government, and the other in Bengal which was initiated and financed by the Indian Statistical Institute, Calcutta, completed by us in 1945, equipped us with the experience necessary for such large-scale surveys, the details of which were set out in the reports of these surveys both with regard to the technique of field investigations and the methods of statistical analysis of the serological and anthropometric data. The anthropometric data collected in the United Provinces were handed over to Prof. P. C. Mahalanobis, F.R.S., of the Statistical Laboratory, Calcutta, who with his colleague, Mr. C. R. Rao, analysed them at Calcutta and a summary of the results obtained from the statistical analysis was published in the Proceedings of the Indian Science Congress Association, Bangalore Session, 1946. Mahalanobis applied his Generalised Distance method in the final treatment of the anthropometric data and the results have been found to be very significant both with regard to the suitability of the statistical tool and the quality and reliability of the data. As this was the first occasion, at least in India, that a random sample survey was attempted with human material for racial studies, the results must be highly instructive and we found that the conclusions arrived at independently by the statistician and the anthropologist, the former by marshalling the anthropometric data and the latter by a study of definite and indefinite characters, agree in essentials, a fact which is likely to lead to greater collaboration between the two branches of science.

2. The Report of the U. P. Anthropometric Survey is being published with the individual measurements in Sankhya, the organ of the Indian Statistical Institute and will also be separately published in book form. [The serological data on the U. P. tribes and castes have been analysed at Lucknow and published in the Eastern Anthropologist, Vol. I, No. I (1947)]. The Bengal Survey of 1945 in which about 4,000 adults belonging to the various parts of the Province,—Hindus, Muslims and other minority communities,—were measured and a similar number of persons tested with regard to the blood-group frequencies among them, was the second large undertaking by us. Both the anthropometric and serological data are being analysed by Mahalanobis.

3. Regarding the sampling technique both in the U. P. and Bengal, we may quote the following passage from the Joint Report on the U. P. Racial Survey (1941-43) by Mahalanobis, Majumdar and Rao. Mahalanobis writes as follows: "The random selection of a sample is not always an easy task. To pick up a random sample in a demonstrably rigorous fashion requires very elaborate preliminary arrangements which are not often possible in practice. In this situation, rough and ready methods have to be used. The important point, however, is to exclude any personal bias on the part of the observer. In the present investigation, Dr. D. N. Majumdar went to each locality, collected all healthy adult males usually between the ages of 25 and 40 (belonging to the caste or tribe under survey) who happened to be available, arranged them in serial order, and picked up either the odd or even numbered individuals for measurement. The only restriction he used was to avoid examining more than one person belonging to the same family, but did not use any other principle of selection. Strictly speaking, exclusion of more than one individual belonging to the same family makes the sample theoretically somewhat different from an ideal random sample. In estimating mean values, the only effect would be that arising from the varying number of adult males in the different families; such variation, however, must be small and almost certainly negligible. Variabilities in the present sample may also be slightly larger than those in the general populationl but this would make tests of significance err on the safe side. In any case there is no difficulty in making valid comparison among samples collected in the same way.

"To sum up, Dr. Majumdar was fully aware of the need of selecting the individuals at random, and he took particular care to eliminate all choice on his own part. The present samples may, therefore, be treated as having been drawn, for all practica, purposes, at random. As far as one can judge, the assumption of randomness is more true of the present material than of any other series of anthropometric measurements so far available in India."

4. As the subjects who submitted to anthropometric tests were also required for blood grouping, it was not possible to get more than one person per family who would volunteer for the purpose, and blood groups being genic, the 'selection' if it could be proved, did help rather than prejudice our serological material. The same methods and techniques of investigation followed in the United Provinces and in Bengal were employed in Gujarat with local adjustments of minor nature where necessary, and therefore, the anthropometric and serological data collected during the three surveys are comparable. We made it certain that no change in our ideas of measurements or of technique took place during the period covering the time required for the three surveys though changes in the personnel of the laboratory staff had to be made, the casualties having been due to the demand for the assistants elsewhere including the Anthropological Survey of India. The anthropometric measurements were all taken by one person (in this case by Dr. Majumdar himself), the serological tests were done under his supervision and the results in every case compared between the assistants and the supervisor.

5. The serological technique followed in the Gujarat Survey was similar to that already described for the U. P. Survey, (*vide* Eastern Anthropologist, Vol. I, No. I, 1947, pp. 8-16). It conforms to the recommendations of the Blood Transfusion Research Committee of the Medical Research Council (Med. Res. Coun. War Mem. No. 9, 1944). The testing sera were supplied by the Haffkine Institute, Bombay and arranged for by the Gujarat Research Society. High titred sera with capacity to react with A_2 and A_2B cells were taken from Lucknow as and when required, the donors being at Lucknow. The active interest of the office bearers of the G. R. Society, particularly of Mr. P. G. Shah, and the generous response of the local authorities both in British India and in the States, helped to expedite the survey and we were able to complete the work in record time. The time factor was important in this case as we wanted to complete the work within a reasonably short period, due to the fact that the University of Lucknow sanctioned us duty leave for a month to be affixed to the long vacation of three months, and no further extension of leave was possible. Our movements were speeded where necessary by air travel. Although the distances travelled were considerable, the centres visited mostly rural, and the work done considerable in volume, it was possible to complete the survey because of the interest of the investigators in the work and thanks must be given to the assistants, particularly Mr. Sher Singh, Mr. S. Roy, and Mr. T. B. Naik. To the people of cultural Gujarat, we are grateful for both hospitality and enlightened interest in our research. The material and equipments for the Survey were loaned by the Lucknow University. The Gujarat Research Society paid a lump grant of Rs. 2,800/– towards the pay and remuneration of the staff and travelling and boarding expenses, Dr. Majumdar and T. B. Naik working in voluntary and honorary capacities. Thanks are also due to the Council of the Gujarat Research Society not merely for the financial assistance and active interest in the work, but also for the uniform courtesy shown to us and their anxiety to understand our points of view whenever any cause for determining initiative arose.

6. Twenty-two castes and tribes of cultural Gujarat including Kathiawar and Cutch were examined both with respect to their somatology and serology, and the social groups included in the Survey were reached at the centres of their concentration. The Bhils were examined in the Panchmahal district and in Rajpipla, also from the western Khandesh, the Macchis from the Rajpipla State, the Satwaras from Ahmedabad, Billimora, Porbunder, Dwarka and Mithapur, the Kolis from Cutch and Ahmedabad, the Waghers from Porbunder, Dwarka and Mithapur, the Rabaris from Porbunder, Jamnagar and Cutch, the Kharwas from Porbunder, the Kunbi Pattidars from Rajpipla State, Billimora, Nawanagar State, Cutch and Ahmedabad, the Bhatias from Cutch, Nawanagar, Porbunder and Bombay, the Audich Brahmins from Nawanagar State, Cutch, Porbunder, Dwarka and Bombay, the Luhanas from Porbunder, Jamnagar and Cutch, some from Bombay, the Mehrs from Porbunder, Nagar Brahmins from Cutch, Rajkot, Jamnagar and Bombay, Mianas from Cutch, Dwarka, Mithapur and other coastal areas of Kathiawar, the Sunni Borahs from Rajpipla, Ahmedabad, Cutch and Bombay, the Bhangis from Porbunder and Jamnagar, the Parsis from Billimora and Bombay, the Memons and the Khojas from Cutch, Porbunder, Jamnagar and Bombay, and the Miscellaneous Tribal

groups from the Ahmedabad cotton mills and Billimora. A detailed account of the parts visited will be given in Part Two which will contain the analysis of the anthropometric data. The extensiveness of the inquiry will be evident when it is known that we have measured about 3,000 people and tested 3,000 blood samples belonging to 26 groups in cultural Gujarat. We have only included in our analysis, castes and tribes from whom one hundred or more individuals could be tested, as a sample of less than 100 has not been considered adequate for the purpose.

STATISTICAL ANALYSIS OF THE BLOOD-GROUPS DATA

7. Below we are discussing the results of statistical analysis of the blood-groups data of 22 castes and tribes of Gujarat, Kathiawar and Cutch. The methods of statistical analysis adopted are precisely the same as those for the analysis of the blood-groups data of representative castes and tribes in the United Provinces. However, to make this paper self-contained, these methods have been briefly explained in the subsequent paragraph.

8. Let the true gene probabilities of the triple allelomorphic genes A, B, and O for a caste (or tribe) be denoted by π_1, π_2 and π_3 respectively. Then $\pi_1+\pi_2+\pi_3=1$. The values of these population parameters are not known and can only be estimated from the observed frequencies of the four phenotypes for the sample taken from the caste (or tribe). It is well-known that the most efficient estimates of π_1, π_2 and π_3 are provided by the method of maximum likelihood and reference may be made to Stevens (1) in this connexion. Bernstein has also given a method of obtaining efficient estimates of these parameters. The formulae for the variances and covariances of Bernstein's improved estimates have been worked out by Sukhatme (2). In our present investigation, we have throughout used estimates derived by the method of maximum likelihood and denoted the estimated probabilities of A, B, and O genes by p,q and r respectively.

9. The blood-groups data of the 22 castes and tribes collected during the Racial Survey of Gujarat, Kathiawar and Cutch are presented in Table 1. Column (2) of the Table gives the size of the observed samples for the various castes and tribes, and Columns (3), (4), (5) and (6), the observed frequencies of the four phenotypes O, A, B, AB. Using the maximum likelihood estimates of the true gene probabilities, the conformity of these blood-groups data with the genetical theory advanced by Bernstein [(3) and (4)] has been tested by applying the χ^2 test with one degree of freedom. The values of χ^2 for the various castes and tribes are shown in Column (7) and the corresponding levels of probability in Column (8). Here, as also in all the other tables, items significant at the 5 per cent level of probability are marked with a single asterisk, those significant at the 1 per cent level with two asterisks and those significant at the 0.1 per cent level with three asterisks. It would appear from this table that the value of χ^2 is not significant for any of the castes and tribes at the customary 5 per cent level of probability. Thus the blood-groups data for all the 22 castes and tribes are in good agreement with Bernstein's genetical theory.

10. The maximum likelihood estimates of the true gene probabilities for the 22 castes and tribes, along with their standard errors, are given in Table 2. Column (3) of this Table gives the estimated gene probabilities, Column (4) the corresponding variances and Column (5) the estimated gene probabilities and their standard errors, both multiplied by 100. The homogeneity of the estimated probabilities for A, B and O genes for these 22 castes and tribes is then tested by applying the χ^2-test. In this case, $\chi^2 = 82{\cdot}1252$ with 42 degrees of freedom. This gives $\sqrt{2\chi^2} - \sqrt{2n-1} = 3.7060$ and leads to the conclusion that the gene probabilities are not all equal for the above 22 castes and tribes. In order to determine whether the homogeneity is attributable to the differences in one or more of the three gene probabilities, the χ^2 has been partitioned, first for differences in the estimated probabilities (p) of the A genes, then for differences in the estimated probabilities (q) of the B genes and finally for differences in the estimated probabilities (r) of the O genes, and the results are presented in Table 3. It would appear from this Table that the heterogeneity among the estimated gene probabilities is ascribable to the differences among all the three probabilities.

11. The heterogeneity among the estimated probabilities of A, B and O genes having been demonstrated to be attributable to the variation in the estimated probabilities p of A genes, q of B genes and r of O genes, we proceed to test the significance of the differences among the p's, q's and r's for the 22 castes and tribes. In Table 4 are given the differences among the estimated probabilities p of A genes. In this Table, the figure in each cell is the difference between the values of p for the two castes (or tribes) given at the top of the vertical column and the extreme left of the horizontal row containing the cell. Thus, for instance, the value of the difference, Rabaris—Satwaras, is 0.004679. In this Table, as also in Tables 5 and 6, significant positive differences have been marked with one, two or three asterisks according as these are significant at the 5 per cent level, 1% level or 0.1% level, respectively, the significance having been tested by finding out the ratio of each of these differences to its standard error and treating this ratio as a normal variate with zero mean and unit variance. It would appear from Table 4 that the value of p for Sunni Borahs is not significantly different from the p-values for Waghers, Luhanas, Kolis, Miscellaneous Tribal, Rajpipla Bhils, Parsis, Kharwas, Khojas, Memons, Audich Brahmins, Mianas and Satwaras, but is significantly lower than the p-values for Khandesh Bhils, Panchmahal Bhils, Kunbi Pattidars, Rabaris, Nagar Brahmins, Bhatias, Mehrs, Bhangis and Macchis. The p-values for Waghers and Luhanas, the difference between which is not significant, are not significantly different from the p-values for Kolis, Miscellaneous Tribal, Rajpipla Bhils, Parsis, Kharwas, Khojas, Memons, Khandesh Bhils, Panchmahal Bhils, Audich Brahmins, Mianas, Satwaras, Kunbi Pattidars, Rabaris and Nagar Brahmins, but are significantly lower than the p-values for Bhatias, Mehrs, Bhangis and Macchis. The p-values for Kolis, Miscellaneous Tribal, Rajpipla Bhils and Parsis, the differences among which are not significant, are not significantly different from the p-values for Kharwas, Khojas, Memons, Khandesh Bhils, Panchmahal Bhils, Audich Brahmins, Mianas, Satwaras, Kunbi Pattidars, Rabaris, Nagar Brahmins, Bhatias and Mehrs, but are significantly lower than the p-values for Bhangis and Macchis. The p-values for Kharwas,

14. From the point of view, therefore, of homogeneity among the estimated probabilities of B genes, the 22 castes and tribes may be arranged in groups as under, the castes and tribes in each group having usually higher q-values than those in the preceding group :—

(a) Khandesh Bhils;

(b) Mehrs and Panchmahal Bhils;

(c) Nagar Brahmins;

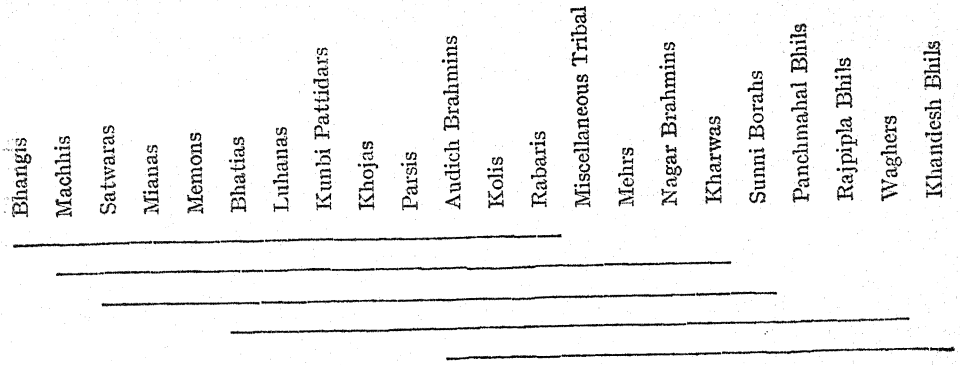
(d) Rajpipla Bhils;

(e) Macchis; and

(f) Kharwas, Waghers, Bhatias, Rabaris, Audich Brahmins, Miscellaneous Tribal, Kunbi Pattidars, Sunni Borahs, Parsis, Khojas, Kolis, Bhangis, Satwaras, Mianas, Luhanas and Memons.

15. We finally proceed to test the significance of the differences in the r's among the 22 castes and tribes. These differences are shown in Table 6, where, as before, the figure in each cell is the difference in the values of r for the two castes (or tribes) given at the top of the vertical column and the extreme left of the horizontal row containing the cell. It would appear from this Table that the value of r for Bhangis is not significantly different from the r-values for Macchis, Satwaras, Mianas, Memons, Bhatias, Luhanas, Kunbi Pattidars, Khojas, Parsis, Audich Brahmins, Kolis and Rabaris, but is significantly lower than the r-values for Miscellaneous Tribal, Mehrs, Nagar Brahmins, Kharwas, Sunni Borahs, Panchmahal Bhils, Rajpipla Bhils, Waghers and Khandesh Bhils. The r-value for Macchis is not significantly different from the r-values for Satwaras, Mianas, Memons, Bhatias, Luhanas, Kunbi Pattidars, Khojas, Parsis, Audich Brahmins, Kolis, Rabaris, Miscellaneous Tribal, Mehrs, Nagar Brahmins and Kharwas, but is significantly lower than the r-values for Sunni Borahs, Panchmahal Bhils, Rajpipla Bhils, Waghers and Khandesh Bhils. The r-values for Satwaras, Mianas and Memons, the differences among which are not significant, are not significantly different from the r-values for Bhatias, Luhanas, Kunbi Pattidars, Khojas, Parsis, Audich Brahmins, Kolis, Rabaris, Miscellaneous Tribal, Mehrs, Nagar Brahmins, Kharwas and Sunni Borahs, but are significantly lower than the r-values for Panchmahal Bhils, Rajpipla Bhils, Waghers and Khanddesh Bhils. The r-values for Bhatias, Luhanas, Kunbi Pattidars, Khojas and Parsis, the differences among which are not significant, are not significantly different from the r-values for Audich Brahmins, Kolis, Rabaris, Miscellaneous Tribal, Mehrs, Nagar Brahmins, Kharwas, Sunni Borahs, Panchmahal Bhils, Rajpipla Bhils and Waghers, but are significantly lower than the value for r for Khandesh Bhils. There are no significant differences among the r-values for Audich Brahmins, Kolis, Rabaris, Miscellaneous Tribal, Mehrs, Nagar Brahmins, Kharwas, Sunni Borahs, Panchmahal Bhils, Rajpipla Bhils, Waghers and Khandesh Bhils.

The symbolical representation of these conclusions is as follows:—



16. It would appear from the above that from the standpoint of homogeneity among the estimated probabilities of O genes, the 22 castes and tribes may be arranged in the following groups, the castes and tribes in each group having higher r-values than those in the preceding group:—

(a) Bhangis;

(b) Macchis;

(c) Satwaras, Mianas and Memons;

(d) Bhatias, Luhanas, Kunbi Pattidars, Khojas and Parsis; and

(e) Audich Brahmins, Kolis, Rabaris, Miscellaneous Tribal, Mehrs, Nagar Brahmins, Kharwas, Sunni Borahs, Panchmahal Bhils, Rajpipla Bhils, Waghers and Khandesh Bhils.

17. On account of the heterogeneity among the estimated gene probabilities for the 22 castes and tribes, the weighted means of p, q and r (the weights being the sizes of the observed samples) are not efficient estimates of the true gene probabilities. The weights which have, therefore, been used by us are reciprocals of the variances as these yield estimates of the mean values with the least variance. Denoting the mean values thus obtained by $\bar{p}$, $\bar{q}$ and $\bar{r}$, we have

$$\bar{p}=0.194949\pm0.00538609,$$
$$\bar{q}=0.231587\pm0.00580431,$$
$$\bar{r}=0.565531\pm0.00698427,$$

The corresponding percentages and their standard errors can be immediately obtained by multiplying each of these figures by 100.

18. The serological data for the tribes and castes of the United Provinces have indicated in a general way the racial distance of the various social groups as there is some correspondence between the order of social precedence of the groups with their p-values, the heterogeneity of the estimated probabilities of A, B and O genes having been found to be mainly attributable to the variation in the estimated pro-

babilities (p) of A genes. The United Provinces does contain a mixed population and the degree of intermixture can be found out by comparing the samples with known hybrid castes or mixed population as in a College which caters for all provinces, castes, creeds and complexions. In cultural Gujarat, the various samples have proved to be heterogeneous with respect to all the three genes. The Bhils of different areas show serological differences among them and we had explained this elsewhere by suggesting that the Bhil is a generic name including different racial strains. The Kolis, Miscellaneous Tribal people and the sections of the Bhils we have examined should form a constellation if we accept the view usually put forward that the tribal groups have remained isolated due either to cultural backwardness or fear of the more organised and advanced social groups from whom they have received little consideration and more contempt. On the basis of their p-values, these groups may be said to form a constellation; and if we interpret the arrangement with respect to their q-values a bit liberally, we find our assumption more or less corroborated. Of the tribal groups, the Kolis, particularly those living in Cutch, have provided and do till today, the loose elements which have canalised alien blood in the veins of other castes, as well as in their own.

19. Except the tribal groups and that also in a very general way, no other social group in cultural Gujarat can be safely placed in any particular constellation. This may be due to the following reasons singly or in combination. (1) Cultural Gujarat is racially a homogeneous area. Whatever might have been the racial complexion of Gujarat in earlier days, today the various strains have got mixed up and that is why, from the mean values of the head measurements, Gujarat stands out as a mesochephalic province. Without anticipating the results of the statistical analysis of the anthropometric data, we may distinguish at least two racial types in cultural Gujarat, one brachycephalic and leptorhine, the other dolichocephalic mesorhine while in between these two types are found a large number of mixed ones showing varying degrees of intra-group association. There is no type today which can be exclusively found in any cultural group, though the indications are that the higher castes show more of brachycephaly than the lower castes, the tribal groups being predominantly dolichocephalic. (2) Cultural Gujarat had a migrant population. From the early prehistoric times, Gujarat had swayed her influence all over India so that the composition of the population in Gujarat could not remain stable. Even in the historic period, Gujarat has absorbed and assimilated various alien strains, and the incompatibility of such admixture may have been reflected in the composition of the blood of her population. The Muslim population in Gujarat, Kathiawar and Cutch have not been a stable community. At one end it has absorbed the Mediterranean strain which entered India both by land and sea; at the other end, it could infuse its blood into some of the higher castes like the Luhanas and the Bhatias who are predominantly brachycephalic. Like the Makranis who are today a mixed people resulting from mixture between the immigrant Baluchis and the tribal groups, usually from Baluchi father and Bhil or Koli mother, the various Muslim groups are recruited from intermixture between the immigrant Muslims and the Hindu castes, mostly upper ones. There are also Negroid infiltration in the maritime States in particular.

20. Assuming that the blood group frequencies among the castes and tribes do not give us any other information than that of heterogeneity, we may yet find out degrees of association and remoteness, provided we know the cultural background of the social groups. The Sunni Borahs stand out as a separate constellation from the other Muslim castes. We are told that they are a closed group. The Waghers and the Luhanas whom we tested at places where they have been living for generations could be taken as endogamous and closely knit groups. There is very little difference in the blood group gene frequencies between Waghers and those of them who have accepted Islam. The Khojas have been recruited from the Luhana caste mostly, and their association with some of the tribal groups and the Kharwas, probably suggests isolation which however is not the case with the Muslims of other Provinces who are also converts from Hinduism. The Memons and the Mianas are closely related. The Rabaris are a local group in Kathiawar and they seem to have maintained their racial type as they are easily distinguishable by their tall stature and graceful features. The Audich Brahmins, Nagar Brahmins, Bhatias, Mehrs, Mianas and Kunbi Pattidars form a constellation with respect to their p-values. Most of the other groups show an erratic distribution which may be due either to genic disbalance or due to large-scale intermixture or to both. Even the Parsis are a mixed stock. The high class Parsis are an inbred lot, but the poorer section is certainly outbreeding even today and the latter outnumber the former. The serological status of the Parsis is similar to that of the upper castes in Gujarat but the high incidence of B affiliates them more to the lower castes or mixed groups elsewhere, and that is probably due to the fact that our sample from Parsis contained more blood from Parsi children belonging to poor parents, mostly students of a Parsi School of the endowed type.

21. To sum up, it is indeed doubtful if we can say much about the racial distance of the tribes and castes of Cultural Gujarat on serological evidence alone. The tribal groups, the Mehrs, the Waghers and the Rabaris can be isolated from the higher castes and the Parsis, but that dissection may not be safe for all practical purposes. Although the Muslim groups show some differences among them, they do not appear to be distant from the high castes, particularly from the Luhanas, the Bhatias and the Brahmins. The Kharwas and the Macchis are intermediate between the higher caste groups, and the tribal and the Parsis approach the Hindu castes more with respect to q-value, while the Bhangis of Gujarat, more exactly of Kathiwar, for they were measured from Porbunder and Nawanagar States, form a constellation on the basis of r-value. The arrangements indicated in the text are only tentative and we shall anxiously await the anthropometric evidence.

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TABLE 1.

BLOOD-GROUP FREQUENCIES FOR DIFFERENT CASTES AND TRIBES AND THEIR AGREEMENT WITH BERNSTEIN'S THEORY

Castes and Tribes	Total No.	Frequency				x^2	Probability
		O	A	B	AB		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mehrs	104	32	38	28	6	1.8069	.20> P> .10
Sunni Borahs	132	45	27	54	6	1.9696	.20> P> .10
Kunbi Pattidars ..	134	40	34	44	16	.3993	.70> P> .50
Luhanas	147	42	30	61	14	.0200	.90> P> .80
Parsis	231	70	54	84	23	.0099	.95> P> .90
Rabaris	134	44	35	39	16	1.0789	.30> P> .20
Bhangis	126	30	36	38	22	1.7191	.20> P> .10
Khojas	120	36	28	42	14	.1982	.70> P> .50
Nagar Brahmins ..	107	36	35	28	8	.3482	.70> P> .50
Waghers	120	46	26	40	8	.0184	.90> P> .80
Satwaras	100	25	25	38	12	.0012	.98> P> .95
Audich Brahmans ..	106	36	24	31	15	3.3979	.10> P> .05
Machhis	108	30	36	24	18	2.9891	.10> P> .05
Kharwas	106	40	24	30	12	.0743	.80> P> .70
Memons	100	25	24	40	11	2.0571	.20> P> .10
Mianas	100	24	26	40	10	.5487	.50> P> .30
Bhatias	106	32	31	29	14	.9316	.50> P> .30
Panchmahal Bhils ..	369	137	101	98	33	.8107	.50> P> .30
Rajpipla Bhils	156	60	38	45	13	.2844	.70> P> .50
Khandesh Bhils ..	200	80	58	48	14	.0254	.90> P> .80
Kolis	100	32	21	36	11	.4422	.70> P> .50
Miscellaneous Tribal ..	100	33	23	35	9	.0064	.95> P> .90

TABLE 2

ESTIMATED GENE PROBABILITIES AND THEIR STANDARD ERRORS FOR THE 22 CASTES AND TRIBES

Caste or Tribe	Gene	Estimated Probability	Variance	Percentage and Standard Error
(1)	(2)	(3)	(4)	(5)
			$\times 10^{-3}$	
MEHRS	O	0.574675	1.396810	57.4675 ± 3.7376 %
	A	0.243474	1.023038	24.3474 ± 3.1984 %
	B	0.181851	0.791906	18.1851 ± 2.8141 %
			$\times 10^{-3}$	
SUNNI BORAHS	O	0.600490	1.074760	60.0490 ± 3.2787 %
	A	0.135359	0.477051	13.5359 ± 2.1843 %
	B	0.264151	0.864817	26.4151 ± 2.9407 %
			$\times 10^{-3}$	
KUNBI PATTIDARS.. ..	O	0.537550	1.197711	53.7750 ± 3.4612 %
	A	0.207052	0.666270	20.7052 ± 2.5813 %
	B	0.255398	0.798693	25.5398 ± 2.8261 %
			$\times 10^{-3}$	
LUHANAS	O	0.536365	1.042651	53.6365 ± 3.2296 %
	A	0.163129	0.507671	16.3129 ± 2.2530 %
	B	0.300506	0.861000	30.0506 ± 2.9343 %
			$\times 10^{-3}$	
PARSIS	O	0.549459	0.649182	54.9459 ± 2.5479 %
	A	0.183382	0.359116	18.3382 ± 1.8950 %
	B	0.267159	0.497854	26.7159 ± 2.2314 %
			$\times 10^{-3}$	
RABARIS	O	0.558998	1.101675	55.8998 ± 3.3196 %
	A	0.211039	0.701058	21.1039 ± 2.6478 %
	B	0.230063	0.755671	23.0063 ± 2.7490 %
			$\times 10^{-3}$	
BHANGIS	O	0.466419	1.270159	46.6419 ± 3.5637 %
	A	0.261431	0.892847	26.1431 ± 2.9880 %
	B	0.272150	0.923348	27.2150 ± 3.0386 %
			$\times 10^{-3}$	
KHOJAS	O	0.539122	1.261868	53.9122 ± 3.5525 %
	A	0.192687	0.722053	19.2687 ± 2.6872 %
	B	0.268191	0.961021	26.8191 ± 3.1000 %
			$\times 10^{-3}$	
NAGAR BRAHMINS.. ..	O	0.586302	1.335214	58.6302 ± 3.6538 %
	A	0.227549	0.938170	22.7549 ± 3.0630 %
	B	0.186149	0.786268	18.6149 ± 2.8041 %
			$\times 10^{-3}$	
WAGHERS	O	0.620776	1.135871	62.0776 ± 3.3705 %
	A	0.153593	0.589661	15.3593 ± 2.4284 %
	B	0.225631	0.831257	22.5631 ± 2.8832 %
			$\times 10^{-3}$	
SATWARAS	O	0.500625	1.570008	50.0625 ± 3.9623 %
	A	0.206360	0.919563	20.6360 ± 3.0325 %
	B	0.293015	1.238799	29.3015 ± 3.5199 %

TABLE 2—(*contd.*)

ESTIMATED GENE PROBABILITIES AND THEIR STANDARD ERRORS FOR THE 22 CASTES AND TRIBES—(*Concluded*).

Caste or Tribe	Gene	Estimated Probability	Variance	Percentage and Standard Error
(1)	(2)	(3)	(4)	(5)
			$\times 10^{-3}$	
AUDICH BRAHMINS ..	O	0.555424	1.399803	55.5424 ± 3.7417 %
	A	0.201334	0.850190	20.1334 ± 2.9158 %
	B	0.243242	1.002335	24.3242 ± 3.1654 %
			$\times 10^{-3}$	
MACHHIS	O	0.498648	1.455470	49.8648 ± 3.8144 %
	A	0.287272	1.128514	28.7272 ± 3.3601 %
	B	0.214080	0.879266	21.4080 ± 2.9653 %
			$\times 10^{-3}$	
KHARWAS	O	0.594751	1.331930	59.4751 ± 3.6497 %
	A	0.185053	0.789498	18.5053 ± 2.8098 %
	B	0.220196	0.920684	22.0196 ± 3.0343 %
			$\times 10^{-3}$	
MEMONS	O	0.504690	1.569275	50.4690 ± 3.9611 %
	A	0.194377	0.872524	19.4377 ± 2.9538 %
	B	0.300933	1.266509	30.0933 ± 3.5595 %
			$\times 10^{-3}$	
MIANAS	O	0.502875	1.568710	50.2875 ± 3.9611 %
	A	0.201718	0.901490	20.1718 ± 3.0025 %
	B	0.295407	1.247340	29.5407 ± 3.5313 %
			$\times 10^{-3}$	
BHATIAS	O	0.534225	1.429660	53.4225 ± 3.7815 %
	A	0.238984	0.986386	23.8984 ± 3.1407 %
	B	0.226781	0.942736	22.6781 ± 3.0703 %
			$\times 10^{-4}$	
PANCHMAHAL BHILS ..	O	0.602775	3.778824	60.2775 ± 1.9440 %
	A	0.201141	2.442700	20.1141 ± 1.5630 %
	B	0.196084	2.388398	19.6084 ± 1.5453 %
			$\times 10^{-3}$	
RAJPIPLA BHILS ..	O	0.614444	0.879057	61.4444 ± 2.9650 %
	A	0.178944	0.520735	17.8944 ± 2.2819 %
	B	0.206612	0.592006	20.6612 ± 2.4331 %
			$\times 10^{-3}$	
KHANDESH BHILS ..	O	0.630993	0.667450	63.0993 ± 2.5836 %
	A	0.199821	0.448373	19.9821 ± 2.1175 %
	B	0.169186	0.386275	16.9186 ± 1.9655 %
			$\times 10^{-3}$	
KOLIS	O	0.555556	1.492103	55.5556 ± 3.8626 %
	A	0.174233	0.792312	17.4233 ± 2.8148 %
	B	0.270211	1.161401	27.0211 ± 3.4073 %
			$\times 10^{-3}$	
MISCELLANEOUS TRIBAL ..	O	0.573274	1.458483	57.3274 ± 3.8184 %
	A	0.175247	0.797242	17.5247 ± 2.8235 %
	B	0.251479	1.094373	25.1479 ± 3.3076 %

TABLE 3. THE PARTITION OF x^2

Source.	Degrees of Freedom	x^2
Differences in p	21	35.229884*
Remainder	21	46.895298***
Total	42	82.125182

Source.	Degrees of Freedom.	x^2
Differences in q	21	47.572645***
Remainder	21	34.552537*
Total	42	82.125182

Source.	Degrees of Freedom.	x^2
Differences in r	21	40.211020**
Remainder	21	41.914162**
Total	42	82.125182

TABLE 4. DIFFERENCES AMONG THE ESTIMATED PROBABILITIES (P) OF A GENES FOR THE 22 CASTES AND TRIBES

	MEHRS	SUNNI BORAHS	KUNBI PATTIDARS	LUHANAS	PARSIS	RABARIS	BHANGIS	KHOJAS	NAGAR BRAHMINS	WAGHERS	SATWARAS	AUDICH BRAHMINS	MACHHIS	KHARWAS	MEMONS	MIANAS	BHATIAS	PANCHMAHAL BHILS	RAJPIPLA BHILS	KHANDESH BHILS	KOLIS	MISCELLANEOUS TRIBAL
Mehrs	——	—.108105	—.036412	—.080335	—.060082	—.032425	.017967	—.050777	—.015915	—.089871	—.037104	—.042130	.043808	—.058411	—.049087	—.041746	—.004470	—.042323	—.064520	—.043643	—.069231	—.068217
Sunni Borahs	.108105**	——	.071693	.027770	.048023	.075680*	.126072***	.057328	.092190*	.018234	.071001	.065975	.151913***	.049694	.059018	.066359	.103635*	.065782*	.043585	.064462*	.038874	.039888
Kunbi Pattidars	.036412	—.071693	——	—.043923	—.023670	.003987	.054379	—.014365	.020497	—.053459	—.000692	—.005718	.080220	—.021999	—.012675	—.005334	.031942	—.005911	—.028108	—.007231	—.032819	—.031805
Luhanas	.080335*	—.027770	.043923	——	.020253	.047910	.098302**	.029558	.064420	—.009536	.043231	.038205	.124143**	.021924	.031248	.038589	.075865*	.038012	.015815	.036692	.011104	.012118
Parsis	.060082	—.048023	.023670	—.020253	——	.027657	.078049*	.009305	.044167	—.029789	.022978	.017952	.103890**	.001671	.010995	.018336	.055612	.017759	.004438	.016439	—.009149	—.008135
Rabaris	.032425*	—.075680	—.003987	—.047910	—.027657	——	.050392	—.018352	.016510	—.057446	—.004679	—.009705	.076233	—.025986	—.016662	—.009321	.027955	—.009898	—.032095	—.011218	—.036806	—.035792
Bhangis	—.017967	—.126072	—.054379	—.098302	—.078049	—.050392	——	—.068744	—.033882	—.107838	—.055071	—.060097	.025841	—.076378	—.067054	—.059713	—.022437	—.060290	—.082487	—.061610	—.087198	—.086184
Khojas	.050777	—.057328	.014365	—.029558	—.009305	.018352	.068744	——	.034862	—.039094	.013673	.008647	.094585*	—.007634	.001690	.009031	.046307	.008454	—.013743	.007134	—.018454	—.017440
Nagar Brahmins	.015915	—.092190	—.020497	—.064420	—.044167	—.016510	.033882	—.034862	——	—.073956	—.021189	—.026215	.059723	—.042496	—.033172	—.025831	.011445	—.026408	—.048605	—.027728	—.053316	—.052302
Waghers	.089871*	—.018234	.053459	.009536	.029789	.057446	.107838**	.039094	.073956	——	.052767	.047741	.133679**	.031460	.040784	.048125	.085401*	.047548	.025351	.046228	.020640	.021654
Satwaras	.037104	—.071001	.000692	—.043231	—.022978	.004679	.055071	—.013673	.021189	—.052767	——	—.005026	.080912	—.021307	—.011983	—.004642	.032634	—.005219	—.027416	—.006539	—.032127	—.031113
Audich Brahmins ..	.042130	—.065975	.005718	—.038205	—.017952	.009705	.060097	—.008647	.026215	—.047741	.005026	——	.085938	—.016281	—.006957	.000384	.037660	—.000193	—.022390	—.001513	—.027101	—.026087
Machhis	—.043808	—.151913	—.080220	—.124143	—.103890	—.076233	—.025841	—.094585	—.059723	—.133679	—.080912	—.085938	——	—.102219	—.092895	—.085554	—.048278	—.086131	—.108328	—.087451	—.113039	—.112025
Kharwas	.058411	—.049694	.021999	—.021924	—.001671	.025986	.076378	.007634	.042496	—.031460	.021307	.016281	.102219*	——	.009324	.016665	.053941	.016088	—.006109	.014768	—.010820	—.009806
Memons	.049087	—.059018	.012675	—.031248	—.010995	.016662	.067054	—.001690	.033172	—.040784	.011983	.006957	.092895*	—.009324	——	.007341	.044617	.006764	—.015433	.005444	—.020144	—.019130
Mianas	.041746	—.066359	.005334	—.038589	—.018336	.009321	.059713	—.009031	.025831	—.048125	.004642	—.000384	.085554	—.016665	—.007341	——	.037276	—.000577	—.022774	—.001897	—.027485	—.026471
Bhatias	.004470	—.103635	—.031942	—.075865	—.055612	—.027955	.022437	—.046307	—.011445	—.085401	—.032634	—.037660	.048278	—.053941	—.044617	—.037276	——	—.037853	—.060050	—.039173	—.064761	—.063747
Panchmahal Bhils ..	.042323	—.065782	.005911	—.038012	—.017759	.009898	.060290	—.008454	.026408	—.047548	.005219	.000193	.086131*	—.016088	—.006764	.000577	.037853	——	—.022197	—.001320	—.026908	—.025894
Rajpipla Bhils	.064520	—.043585	.028108	—.015815	—.004438	.032095	.082487*	.013743	.048605	—.025351	.027416	.022390	.108328**	.006109	.015433	.022774	.060050	.022197	——	.020877	—.004711	—.003697
Khandesh Bhils	.043643	—.064462	.007231	—.036692	—.016439	.011218	.061610	—.007134	.027728	—.046228	.006539	.001513	.087451*	—.014768	—.005444	.001897	.039173	.001320	—.020877	——	—.025588	—.024574
Kolis	.069231	—.038874	.032819	—.011104	.009149	.036806	.087198*	.018454	.053316	—.020640	.032127	.027101	.113039**	.010820	.020144	.027485	.064761	.026908	.004711	.025588	——	.001014
Miscellaneous Tribal ..	.068217	—.039888	.031805	—.012118	.008135	.035792	.086184*	.017440	.052302	—.021654	.031113	.026087	.112025*	.009806	.019130	.026471	.063747	.025894	.003697	.024574	—.001014	——

TABLE 5. DIFFERENCES AMONG THE ESTIMATED PROBABILITIES (q) OF B GENES FOR THE 22 CASTES AND TRIBES

	Mehrs.	Sunni Borahs.	Kunbi Pattidars.	Luhanas.	Parsis.	Rabaris.	Bhangis.	Khojas.	Nagar Brahmins	Waghers.	Satwaras.	Audich Brahmins.	Machhis.	Kharwas.	Memons.	Mianas.	Bhatias	Panchmahal Bhils.	Rajpipla Bhils.	Khandesh Bhils.	Kolis.	Miscellaneous Tribal.
Mehrs	——	.082300*	.073547	.118655**	.085308*	.048212	.090299*	.086340*	.004298	.043780	.111164*	.061391	.032229	.038345	.119082**	.113556*	.044930	.014233	.024761	—.012665	.088360*	.069628
Sunni Borahs	—.082300	——	—.008753	.036355	.003008	—.034088	.007999	.004040	—.078002	—.038520	.028864	—.020909	—.050071	—.043955	.036782	.031256	—.037370	—.068067	—.057539	—.094965	.006060	—.012672
Kunbi Pattidars	—.073547	.008753	——	.045108	.011761	—.025335	.016752	.012793	—.069249	—.029767	.037617	—.012156	—.041318	—.035202	.045535	.040009	—.028617	—.059314	—.048786	—.086212	.014813	—.003919
Luhanas	—.118655	—.036355	—.045108	——	—.033347	—.070443	—.028356	—.032315	—.114357	—.074875	—.007491	—.057264	—.086426	—.080310	.000427	—.005099	—.073725	—.104422	—.093894	—.131320	—.030295	—.049027
Parsis	—.085308	—.003008	—.011761	.033347	——	—.037096	.004991	.001032	—.081010	—.041528	.025856	—.023917	—.053079	—.046963	.033774	.028248	—.040378	—.071075	—.060547	—.097973	.003052	—.015680
Rabaris	—.048212	—.034088	0.25335	.070443	.037096	——	.042087	.038128	—.043914	—.004432	.062952	.013179	—.015983	—.009867	.070870	.065344	—.003282	—.033979	—.023451	—.060877	.040148	.021416
Bhangis	—.090299	—.007999	—.016752	.028356	—.004991	—.042087	——	—.003959	—.086001	—.046519	.020865	—.028908	—.058070	—.051954	.028783	.023257	—.045369	—.076066	—.065538	—.102964	—.001939	—.020671
Khojas	—.086340	—.004040	—.012793	.032315	—.001032	—.038128	.003959	——	—.082042	—.042560	.024824	—.024949	—.054111	—.047995	.032742	.027216	—.041410	—.072107	—.061579	—.099005	.002020	—.016712
Nagar Brahmins	—.004298	.078002	.069249	.114357***	.081010*	.043914	.086001*	.082042*	——	.039482	.106866*	.057093	.027931	.034047	.114784*	.109258*	.040632	.009935	.020463	—.016963	.084062	.065330
Waghers	—.043780	.038520	.029767	.074875	.041528	.004432	.046519	.042560	—.039482	——	.067384	.017611	—.011551	—.005435	.075302	.069776	.001150	—.029547	—.019019	—.056445	.044580	.025848
Satwaras	—.111104	—.028864	—.037617	.007491	—.025856	—.062952	—.020865	—.024824	—.106866	—.067384	——	—.049773	—.078935	—.072819	.007918	.002392	—.066234	—.096931	—.086403	—.123829	—.022804	—.041536
Audich Brahmins ..	—.061391	.020909	.012156	.057264	.023917	—.013179	.028908	.024949	—.057093	—.017611	.049773	——	—.029162	—.023046	.057691	.052165	—.016461	—.047158	—.036630	—.074056	.026969	.008237
Machhis	—.032229	.050071	.041318	.086426*	.053079	.015983	.058070	.054111	—.027931	.011551	.078935	.029162	——	.006116	.086853	.081327	.012701	—.017996	—.007468	—.044894	.056131	.037399
Kharwas	—.038345	.043955	.035202	.080310	.046963	.009867	.051954	.047995	—.034047	.005435	.072819	.023046	—.006116	——	.080737	.075211	.006585	—.024112	—.013584	—.051010	.050015	.031283
Memons	—.119082	—.036782	—.045535	—.000427	—.033774	—.070870	—.028783	—.032742	—.114784	—.075302	—.007918	—.057691	—.086853	—.080737	——	—.005526	—.074152	—.104849	—.094321	—.131747	—.030722	—.049454
Mianas	—.113556	—.031256	—.040009	.005099	—.028248	—.065344	—.023257	—.027216	—.109258	—.069776	—.002392	—.052165	—.081327	—.075211	.005526	——	—.068626	—.099323	—.088795	—.126221	—.025196	—.043928
Bhatias	—.044930	.037370	.028617	.073725	.040378	.003282	.045369	.041410	—.040632	—.001150	.066234	.016461	—.012701	—.006585	.074152	.068626	——	—.030697	—.020169	—.057595	.043430	.024698
Panchmahal Bhils ..	—.014233	.068067*	.059314	.104422**	.071075**	.033979	.076066*	.072107*	—.009935	.029547	.096931*	.047158	.017996	.024112	.104849**	.099323**	.030697	——	.010528	—.026898	.074127*	.055395
Rajpipla Bhils	—.024761	.057539	.048786	.093894*	.060547	.023451	.065538	.061579	—.020463	.019019	.086403*	.036630	.007468	.013584	.094321*	.088795*	.020169	—.010528	——	—.037426	.063599	.044867
Khandesh Bhils	.012665	.094965**	.086212*	.131320***	.097973***	.060877	.102964**	.099005**	.016963	.056445	.123829**	.074056*	.044894	.051010	.131747**	.126221**	.057595	.026898	.037426	——	.101025*	.082293*
Kolis	—.088360	—.006060	—.014813	.030295	—.003052	—.040148	.001939	—.002020	—.084062	—.044580	.022804	—.026969	—.056131	—.050015	.030722	.025196	—.043430	—.074127	—.063599	—.101025	——	—.018732
Miscellaneous Tribal ..	—.069628	.012672	.003919	.049027	.015680	—.021416	.020671	.016712	—.065330	—.025848	.041536	—.008237	—.037399	—.031283	.049454	.043928	—.024698	—.055395	—.044867	—.082293	.018732	——

TABLE 6. DIFFERENCES AMONG THE ESTIMATED PROBABILITIES (r) OF O GENES FOR THE 22 CASTES AND TRIBES

	Mehrs.	Sunni Borahs.	Kunbi Pattidars.	Luhanas.	Parsis.	Rabaris.	Bhangis.	Khojas.	Nagar Brahmins.	Waghers.	Satwaras.	Audich Brahmins.	Machhis.	Kharwas	Memons.	Mianas.	Bhatias.	Panchmahal Bhils.	Rajpipla Bhils.	Khandesh Bhils.	Kolis.	Miscellaneous Tribal.
Mehrs	——	.025815	—.037125	—.038310	—.025216	—.015677	—.108256	—.035553	.011627	.046101	—.074050	—.019251	—.076027	.020076	—.069985	—.071800	—.040450	.028100	.039769	.056318	—.019119	—.001401
Sunni Borahs	—.025815	——	—.062940	—.064125	—.051031	—.041492	—.134071	—.061368	—.014188	.020286	.099865	—.045066	—.101842	—.005739	—.095800	—.097615	—.066265	.002285	.013954	.030503	—.044934	—.027216
Kunbi Pattidars	.037125	.062940	——	—.001185	.011909	.021448	—.071131	.008572	.048752	.083226	—.036925	.017874	—.038902	.057201	—.032860	—.034675	—.003325	.065225	.076894	.093443*	.018006	.035724
Luhanas	.038310	.064125	.001185	——	.013094	.022633	—.069946	.002757	.049937	.084411	—.035740	.019059	—.037717	.058386	—.031675	—.033490	—.002140	.066410	.078079	.094628*	.019191	.036909
Parsis	.025216	.051031	—.011909	—.013094	——	.009539	—.083040	—.010337	.036843	.071317	—.048834	.005965	—.050811	.045292	—.044769	—.046584	—.015234	.053316	.064985	.081534*	.006097	.023815
Rabaris	.015677	.041492	—.021448	—.022633	—.009539	——	—.092579	—.019876	.027304	.061778	—.058373	—.003574	—.060350	.035753	—.054308	—.056123	—.024773	.043777	.055446	.071995	—.003442	.014276
Bhangis	.108256*	.134071**	.071131	.069946	.083040	.092579	——	.072303	.119883*	.154357**	.034206	.089005	.032229	.128332*	.038271	.036456	.067806	.136356***	.148025**	.164574***	.089137	.106855*
Khojas	.035553	.061368	—.001572	—.002757	.010337	.019876	—.072303	——	.047180	.081654	—.038497	.016302	—.040474	.055629	—.034432	—.036247	—.004897	.063653	.075322	.091871*	.016434	.034152
Nagar Brahmins	—.011627	.014188	—.048752	—.049937	—.036843	—.027304	—.119883	—.047180	——	.034474	—.085677	—.030878	—.087654	.008449	—.081612	—.083427	—.052077	.016472	.028142	.044691	—.030746	—.013028
Waghers	—.046101	—.020286	—.083226	—.084411	—.071317	—.061778	—.154357**	—.081654	—.034474	——	—.120151	—.065352	—.122128	—.026025	—.116086	—.117901	—.086551	—.018001	—.006332	.010217	—.065220	—.047502
Satwaras	.074050	.099865	.036925	.035740	.048834	.058373	—.034206	.038497	.085677	.120151*	——	.054799	—.001977	.094126	.004065	.002250	.033600	.102150**	.113819*	.130368**	.054931	.072649
Audich Brahmins ..	.019251	.045066	—.017874	—.019059	—.005965	.003574	—.089005	—.016302	.030878	.065352	—.054799	——	—.056776	.039327	—.050734	—.052549	—.021199	.047351	.059020	.075569	.000132	.017850
Machhis	.076027	.101842*	.038902	.037717	.050811	.060350	—.032229	.040474	.087654	.122128*	.001977	.056776	——	.096103	.006042	.004227	.035577	.104127*	.115796*	.132345*	.056908	.074626
Kharwas	—.020076	.005739	—.057201	—.058386	—.045292	—.035753	—.128332	—.055629	—.008449	.026025	—.094126	—.039327	—.096103	——	—.090061	—.091876	—.060526	.008024	.019693	.036242	—.039195	—.021477
Memons	.069985	.095800	.032860	.031675	.044769	.054308	—.038271	.034432	.081612	.116086*	—.004065	.050734	—.006042	.090061	——	—.001815	.029535	.098085*	.109754**	.126303**	.050866	.068584
Mianas	.071800	.097615	.034675	.033490	.046584	.056123	—.036456	.036247	.083427	.117901*	—.002250	.052549	—.004227	.091876	.001815	——	.031350	.099900*	.111569*	.128118**	.052681	.070399
Bhatias	.040450	.066265	.003325	.002140	.015234	.024773	—.067806	.004897	.052077	.086551	—.033600	.021199	—.035577	.060526	—.029535	—.031350	——	.068550	.080219	.096768*	.021331	.039049
Panchmahal Bhils ..	—.028100	—.002285	—.065225	—.066410	—.053316	—.043777	—.136356***	—.063653	—.016473	.018001	—.102150**	—.047351	—.104127*	—.008024	—.098085*	—.099900*	—.068550	——	.011669	.028218	—.047219	—.029501
Rajpipla Bhils	—.039769	—.013954	—.076894	—.078079	—.064985	—.055446	—.148025**	—.075322	—.028142	.006332	—.113819*	—.059020	—.115796*	—.019693	—.109754**	—.111569*	—.080219	—.011669	——	.016549	—.058888	—.041170
Khandesh Bhils	—.056318	—.030503	—.093443*	—.094628*	—.081534*	—.071995	—.164574***	—.091871*	—.044691	—.010217	—.130368**	—.075569	—.132345*	—.036242	—.126303**	—.128118**	—.096768*	—.028218	—.016549	——	—.075437	—.057719
Kolis	.019119	.044934	—.018006	—.019191	—.006097	.003442	—.089137	—.016434	.030746	.065220	—.054931	—.000132	—.056908	.039195	—.050866	—.052681	—.021331	.047219	.058888	.075437	——	.017718
Miscellaneous Tribal ..	.001401	.027216	—.035724	—.036909	—.023815	—.014276	—.106855*	—.034152	.013028	.047502	—.072649	—.017850	—.074626	.021477	—.068584	—.070399	—.039049	.029501	.041170	.057719	—.017718	——

LINGUISTIC SURVEY OF THE BORDERLANDS OF GUJARAT

FIELD-WORK NO. 4

The Bhili Dialects

By

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[*Note* :—A detailed and more technical part of this essay is held over for later publication, as the various phonetic types required for printing it are not available at present in India. Previous articles on the subject were published in Vol. V, No. 4 and Vol. VI, No. 4 of the Journal of this Society.]

I. GENERAL

Introduction: This contribution is based on the trip made in December 1946 with the help of Khan Bahadur Kothawala, the Dewan Saheb, Rajpipla State, who had made liberal arrangements for my smooth and comfortable journey. Mr. A. V. Pandya, the State Archæologist, a very keen, intelligent and painstaking research-worker, with the staff consisting of a photographer, a forest officer and a number of other servants accompanied me during the tour, rendering their best help for the success of the trip. Upto Rajpipla, the travel was made by railway; and from Rajpipla, the different centres were reached by car, boat, etc. On account of the heavy rains last year, some roads were still in bad condition and this difficulty was overcome by taking longer roads where the shorter ones were unusable. I thank the Rajpipla State and the Diwan Saheb in particular for taking such keen interest and for helping so liberally the cause of linguistic research.

Centres: The district covered by this FW is the whole of the Borderland of Gujarat in the Doab of Narbudda and Tapti. Three main centres and four subsidiary ones of the Bhili language in this district were touched: (1) Dedia Pada with Nawagam and Besna, (2) Sagbara with Rupdeoṛi, Khayṛi (right on the bank of the Tapti), and Selambā, and (3) Mal Samoṭ. Also one non-bhili centre of Surpan-Mokhṛi with the sub-centres of Gora and Garudeshwar was visited. From Gora to Sulpan and back, the journey was made by boat. In all, 700 miles were travelled in the course of 10 days in this FW.

Data Collected: The following table gives the details of the data collected:-

Serial No.	Name of the RS.	Age	Place	Date	Specimens Supplied	Remarks
1	Jethiyu	48	Dedia Parā	24–12–45	A, B, C	Details regarding the persons who were useful of the verification of the linguistic material, are not included in this table.
2	Tsoknu	40	Nawagam (Dedia Parā)	25–12–45	A, C	
3	Rupu	36	Sagbara	26–12–45	A, B, C	
4	Deheliyu	53	Rupdeori (Sagbara)	27–12–45	C	
5	Vestu	26	Khayri (Sagbara)	27–12–45	A, B	
6	Punyu	30	Mal Samoṭ	28–12–45	A, B, C	
7	Jatriyu	24	Mal Samoṭ	29–19–45	A, B, C	
8	Mithiyu	46	Sulpan	31–12–45	A, B	

Nature of the Language and its Sub-dialects: The country is hilly and woody. The two great ranges of Satpura and Vindhya mountains meet here and bifurtate. Woods of tall timber trees are thick, and rivers and streams are countless. All the centres are several miles in the interior of these hills and woods, and places like Mal Samoṭ are on tablelands, about 2,500 ft. above the sea-level. The communication, therefore, being difficult and slow, the language changes at small distances. As the population in the Bhil area is of a uniform type consisting generally of the Bhils only, doing the same work of felling trees or tilling the land and representing the same stage of development economically and culturally, there are no different grades or classes among the population in villages, as we generally find in Gujarat where every village has at least two or three grades of people. The Bhil womenfolk enjoy more social freedom and freedom of movement than our women, and hence their speech does not differ much from that of the male members. The Bhili languages are, therefore, remarkably compact and uniform as far as each particular centre is concerned. * * * The language of the three centres, Dedia Paḍa, Sagbara and Mal Samoṭ with their sub-centres, is roughly speaking, one, as contrasted with that of the Dhankās of Mokhri and Sulpan which does not appear to be a Bhili language. Among the three Bhili centres, the dialects of Dedia Paḍa and Sagbara are nearer each other than that of Mal Samot which shares some peculiarities of the neighbouring Rajasthani, Khandeshi and other languages. There are a few points, not very significant, of difference between the forms of speech in Dedia Paḍa and Sagbara (to be noted below). But the speech of the main-centres like Dedia Parā and its sub-centres like Nawagam (not more than 6 miles apart) is exactly the same without any variations. Thus in the present F W, it has been possible for us to differentiate only two main dialects, (1) The Bhili and (2) the Dhanki. In the former, there are two Sub-Varieties (a) that of Dadia Paḍa and Sagbara, and (2) that of Mal Samoṭ.

Dhaṇki not a borderland dialect but an internal dialect of Gujarati: Dhaṇki does not appear to be a borderland dialect, but it is an internal dialect of Gujart, though it is much saturated with Bhili and non-Gujarati elements. Another visit to the place and a journey of a few miles further in the interior will be necessary in order to determine exactly the nature and the venue of the Border Dialect of this area. From the evidence available so for, Sulpan does not appear to be on the Border of Gujarati area as was supposed to be, but is in the interior, the borderline will probably go a few miles further north-east. The navigable nature of the Narbudda river is somewhat responsible for the spread of Gujarati on both sides of its banks even in the interior of Kati State. The timber contractors are generally Gujarati speaking people and they take contracts for felling timbers in Marathi and Rajasthani areas. The local work men, the Dhaṇkas, carry the wood down the Narbudda to Broach and come in close contact with Gujarati. Most of these Dhaṇkas are, therefore, bilingual with the resulting interaction between their mother-tongue and Gujarati. I have met with many Dhaṇkas in Mokhṛi and Sulpan who are so familiar with Gujarati that they cannot keep Dhaṇki, their mother-tongue, apart from Gujarati, and while speaking one they contaminate it with the idiom of the other.

The Boundary-line: The Boundary-line of Gujarati language for this area is, therefore, drawn as follows:—In the map No. 46 G, NANDOD of the Survey of India Office, Calcutta, we start with Rupdeoṛi just on the bank of the Tapti in the Rajpipla area and proceed north on the boundary of the Rajpipla State towards the Narbudda river between Sagbara and Raisingpur. We should then go north into the Hills in the Kati State on the east of Deo-ganga river and meet the river Narbudda in Kati State somewhere 20 miles in the east of Sulpan. In the Doab of the Narbudda and the Tapti, the line will include the whole of the Rajpipla area and some portions of Chikli, Raisingpur and Kathi States. We shall now resume the detailed study of these dialects.

II. The Detailed Study

Pronunciation: The Consonants

Stops; As in the other Indo-Aryan languages, the Bhili dialects have all the five classes of stops in full activity. Their pronunciation is very clear and unambiguous. They have well-defined quality which is not much affected by the surrounding vowels and consonants. Their places of articulation are more definite than even those of the stops in SG. Thus the palatalization of a consonant which is almost regular in SG when a palatal vowel or a palatal semi-vowel follows, or finally, in case of many feminine nouns which had -i in Old Gujarati, is totally absent in most of the Bhili centres. In this respect it resembles Vaveci (see FW No. 2, p. 192, l. 20). Thus SG [ākẖ] 'an eye' = Bhili and Vav. [ãkh]; SG [rāt] 'a night' = Bhil. and Vav. [rāt], etc. In all the Bhili

dialects studied here, the occlusion of the stops is longer than that in SG and the explosion, quick, clear and definite. On account of this, the Bhili stops sound chaster and more definite. The *Velers* are pronounced with a stop effected further back in the mouth and the tongue is more quickly released, so that their resonance is richer and deeper. They are not generated so much at the back as to enable us to denote them by [q], as in Arabic, but considerably more backward than in Gujarati. It is owing to this characteristic of the Bhili Velers that they are not affected appreciably by the following front vowels like [i], [e], [E]. Coming to *Palatals*, the place of their articulation is the same as in SG, *i.e.*, a little more forward than the junction of the hard and the soft palates. The stop is somewhat longer and the explosion quick and clean in Dedia Paṛā, not so clean in Sagbārā for [c] and [j], and rather slow and hesitating at Mal Samoṭ.

Thus the [c] and [j] of Sagbārā are slightly affricated; but in Mal Samoṭ the affrication of [c], [j] and [ch], but not of [jh], is so clear that in extreme cases the sounds had to be phonetically transcribed as [ts], [tś] or even as [s], But it should be noted that this affrication is much less than, for example, that. found in Charotar and North Gujrat, (see pp. 326-7 LSI Vol. IX part II). The sound [jh] is, curiously enough, not affricated at all, it is pronounced as a pure palatal. The sound [j] when followed by a palatal element comes forward almost near the teeth-ridge with the stoppage so much reduced that it is often heard as a spirant. This pronunciation is transcribed by the symbol [ʄ]. *The Cerebrals and the Dentals* are neatly kept apart, although it might be expected, on account of the proximity of the Surti dialect, that some confusion should exist among them. This confusion is a well-marked characteristic of Surti. The two [ḍ]s are in regular use, the cerebral stop [ḍ] voiced corresponding to the unvoiced [ṭ] and the flapped voiced, phonetically transcribed as [ṛ]. Their distribution in the language is similar to that in SG. *i,e.*, [ṛ] occurs medially and finally only and never initially, while [ḍ] occurs in all positions. The *Labials* in Bhili are the same, *i.e.*, bi-labial, as in SG.

The pronunciation of stops among the *Dhaṅkās* is, however, different. Their *Velers* are not as deep as those of the Bhils, but similar to those in SG, and are affected, like the SG velers, by the quality of the following sounds. Their explosion is not so clear and the enunciation not as chaste as that of the Bhils. Their *palatals* (except the [jh]), are affricated to a larger extent and remind us of the high affrication of Charotar. This affrication is more pronounced when a palatal vowel follows. The Dhaṅkas also show some *confusion between the dentals and the cerebrals*—an influence of the Surti dialect. They perform their dentals at the teeth-ridge and not at the teeth and hence these stops often sound as the cerebrals. But the cerebrals are produced at their proper place and hence do not sound like the dentals. The flapped [ṛ] is more common among the Dhaṅkās than among the Bhils.

Nazel stops: In the Bhili dialects, only 2 nazel stops are in regular use, the dental [n] and the labial [m]. The retroflex nazel [ṇ] occurs

uninitially as in SG but is pronounced so weak, that it is often not heard at all. It uniformly nazalizes the preceding vowel, as Bhili [p ãĩ] = SG [pāṇī] 'water.' The really fully vital nazels are therefore only [n] and [ṁ], which can come in all positions. Unlike Sanskrit, but quite like Gujarati, they are not changed to a veler or a palatal or a retroflex nazel when followed by a stop consonant belonging to one of these classes. The Dhaṇkas, quite unlike the Bhils, have [n̤] of full and clear audibility, as the SG.

For *Aspiration—Disaspiration* and for *Voicing-Devoicing*, see below.

Semi-vowels: In the Bhili centres [y] is pronounced so closed that a contact or a friction between the tongue and the hard palate is clearly heard; consequently in many favourable circumstances (such as the vicinity of a palatal sound, etc.) it is heard as the consonant [j]: thus SG [kʌriye] 'let us do' is spoken in Bhili as [kʌrije]. This tendency is found, though to a considerably less extent, among the Dhaṇkās also. In Bhili, the [v] is bi-labial, but it tends to become dento-labial fricative voiced, when followed by an [i]: as Bhili [d̤ovhi] 'a ladle'.

The Liquid [r] is uniformly the same in all the dialects; it is a strong and rolled variety and differs from the corresponding SG sound which is a tapped one. The [l] is often confused with [n] (see below); otherwise, it is the same as in SG. There appears some definite drawback among the Bhils with regard to the pronunciation of the [l], otherwise, there appears to be no reason why it should be confused with [n] with which it has but few common points. The SG [l̤] tapped, retroflex, lateral, voiced, it totally absent in all these dialects. For the equations of SG [l̤] with [l] and of SG [l] with [n] see below.

Sibilants: The genuine SG sibilants are absent in all these dialects. Occasionally the palatal [s'] is heard in Dhaṇki in places where SG has it. The genuine dental sibilant [s] is changed to [h] unvoiced (see below). The cerebral sibilant [ṣ] of Sanskrit is pronounced in Bhili as [kh] in one available word [əkhār] 'the month of Āṣāḍha' (probably a lone from a neighbouring dialect). In Mal Sāmoṭ and among the Dhāṇkās, the palatal [s'] is affricated and often pronounced as the dental sibilant [s], under the influence of Surti, *e.g.* SG [kās'i] 'Benāres' = Dhāṇ [kāsī], etc. Under such circumstances, it is transcribed as [s],

The Voiced aspirate pharingial fricative [h] is totally absent among the Bhils (see below for equations), though in Dhaṇkās it is in regular use as in SG. *i.e.*, it is voiced and strong initially, is voiced but weak intervocally, is almost dropped post-consonantally and is devoiced finally.

The Glottal Stop: One of the most intresting sounds in the Bhili languages is the Glottal Stop. It is an unvoiced sound. It is created by closing the glottis

completely for a short time and pressing in from behind with the breath accumulated in the wind-pipe from the lungs. The pressure is so great that when the closure is removed, which is done with remarkable sharpness, a sound resembling the opening of a cork from an empty bottle is created. This sound is phonetically called the 'glottal stop'. It is used to avoid the hiatus created by the dropping of an intervocalic consonant. As will be shown below, Bhili loses the intervocalic [r], [l], [n̥] and [h]; and when, as a consequence of this dropping, the two vowels come together, their union is avoided by putting in this glottal stop in place of the dropped consonant. In phonetic transcription it is denoted by the symbol [ʔ]. Examples: [bɔʔyā̃] 'sisters' =SG [bʰhɛno], [jɔʔā̃] 'men' = SG [jʌn̥ā̃], [tūʔu̇̃], 'the bowstring' from Skt [tūṇīva], [māʔā] 'my' = SG [mārā], [d̥oʔā] 'eyes' = SG [d̥oḷā], [ɛ̃ʔɛ̃no] 'a male deer' = SG [hʌrn̥o], etc. It is remarkable that the Dhaṇkas do not have this sound in regular speech.

Thus the table of consonants in use among the Bhils and the Dhāṇkas is given at the end of the article. The Affricated sounds are not shown in the table, though some palatals, as noted above, are regularly affricated; because affrication has not yet reached the stage of the Primary Basis of Articulation. It is only a Secondary Basis so far in these languages concerned. There are in all 34 consonants in use amongst the Bhils and the Dhaṇkas taken together.

Place of articulation	1. Stops					2. Rolled	3. Tapped		4. Fricative		5. Lateral	6. Semi-vowel
	Non-aspirated		Aspirated		Nazel	Non-aspirated	Non-aspirated	Aspirated	Non-aspirated		Voiced	Voiced
	Unvoiced	Voiced	Unvoiced	Voiced	Voiced	Voiced	Voiced	Voiced	Un-voiced	Voiced	Un-aspirated	
Labial ...	p	b	ph	bh (rare)	m	...	...	...	...	...	...	v
Dental ...	t	d	th	dh (rare)	n	...	...	...	s	...	...	...
Retroflex	ṭ	ḍ	ṭh	ḍh	ṇ (rare)	...	ṛ	ṛh	...	...	ḷ	...
Alveolar ...	...	...	...	...	...	r	...	...	...	...	l	...
Palatal ...	c	j	ch	jh	...	...	...	...	...	...	...	y
Veler ...	k	g	kh	gh (rare)	...	...	...	...	...	...	...	...
Pharingial or Glottal ...	ʔ	...	...	...	...	...	...	...	h	ʎ	...	...

The Vowels

The vowels are thoroughly well-defined both in quality and quantity, and are easily distinguishable from one another, except perhaps at the end of words, where [u], [ɔ] and [o] show some confusion. Genuine diphthongs are very few and that helps to keep up the chastity of the vowels. The vowel [ʌ] in stressed positions is pronounced as [ɔ] short (as in Bengali, but shorter), with the colour of the back vowel, quite unlike the pronunciation of the Garassias who speak it with the colouring of the front vowel [ɛ] short (see FW. no. 1, pp. 216-2, J. G. R. S.). Thus SG. [pʌg] 'a foot' = Bhili [pɔg] = Garss [pɛg], etc. The vowel [i] is pronounced clearly in the interior of the word, but it opens up considerably, is shortened and is confused with [ɛ] finally: as SG [nədi] 'a river' = Bhili [nʌdɛ]; SG [chokri] 'a girl' = Bhili [poirɛ]; etc. On the contrary the final [ɔ], a back vowel, is closed to [u], as in SG [ghoṛɔ] = Bhili [koṛu], etc. Following is the list of the vowels found in the Bhili dialects: No. 1 [ī] long, no. 2 [i] short, generally found in the interior of words in accented and unaccented syllables as in [nīdā] 'took,' [jījī] 'an aunt,' etc. and finally in many mono-syllabic words. No. 3 [e] long, found in every position, but confused with [i] finally and no. 4 [ĕ] short found generally finally. No. 5 [ɛ] is long. It occurs internally and in accented syllables generally in identical positions where the SG [ɛ] occurs internally. Coming to the back vowels, no.10 [ū] long and no. 9 [u] short, the former is found internally in accented syllables and finally in certain mono-syllabic words, while the shorter variety, when it represents the final SG [ɔ], is found finally. The vowel no. 8 [o] is long, is found in all positions, but when final, is confused with the short [u] (see above). The broad back vowel [ɔ], no. 7, is only found internally and in accented syllables in identical positions where it is found in SG. Its short variety, not designated by a special number of its own, is found in words where Guj. has (ʌ); see just above. * * * The vowel no. 6, the cleanest and the most unambiguons vowel in Bhili, as in Gujarati and other Indo-Aryun dialects, is [ā] whether occurring internally or finally, in accented or unaccented positions. It is always long, ultra-long in mono-syllabic and accented poly-syllabic words, varying from long to medium long in pre-accentual syllables and syllables next to the post-accentual ones in long words. At the end, it is generally of the medium length. Among the central vowels, there is only one [ə], no. 11, which occurs internally in unaccented syllables. Its quantity varies from ultra-short to short and is never long as in Marathi or English.

Nasalization of Vowels: The vowels [i], [u], [ɔ], [ɛ] and [ā] are generally nasalized in the Bhili dialects as in SG. But the nasalization here is very weak. Four different shades of nasalization, however, can be distinguished in these dialects. (i) The maximum nasalization found generally in vowels [i], [u] in the interior of the word as [ũṭ̃]; (ii) the less marked nasalization found in [i], [u], [ɛ] and [ɔ]; finally in [i] and [u] as in [āvhĩ] 'will come,' [khāhrũ̃] 'a shoe, and internally in all the four vowels. (iii) The minimum nasalization of [ɔ], [ɛ] and [ā], generally finally and internally in the less predominent syllables. (iv) And lastly, practically no nasalization or only just a colour of it in [ā] in all positions, but particularly finally, as in [tsokā] etc.

In all these grades, the nasalization is strengthened when a nasal consonant follows, as in [kãn̄] 'an ear', etc. The loss of nasalization is a characteristie of the Bhili languages which is eminently shared by the neighbouring languages like Rajasthani and Marathi, but not by Gujarati. There are many words in Bhili which have lost their nasalization like their counterparts in Marathi and Rajasthani, but where Gujarati has preserved it in a stronger form. One of the practical results of the loss of nasalization in final positions in Bhili is the confusion between the m. and n. forms of strong nouns and adjectives which perhaps played a role in abolishing the third gender from the Bhili dialects. The nasalization among the Dhaṇkās, though feeble, is strong enough to preserve the distinction between the m. and the n. The Dhaṇki dialect, therefore, has the neuter gender in regular use. * * * In none of these dialects the nasalization changes the quality of the vowel as in North Gujarat. Thus Bhili., SG., Dhāṇ [gām̃] 'a village', but Thar., Vav., Vaḍh. [gɔm̃]; SG., Bhil., Dhaṇ. pīpər̃] 'a kind of tree', but Thar., Vav., Vaḍh [Pɛ̃pər], etc.. In this respect these dialects agree with Surti, Kathiawari, etc., and differ from those of Charotar and North Gujarati.

Diphthongs; In the Dhaṇki, we see for the first time a tendency to diphthongize the central and the back vowels [ʌ], [ə], [o], [u], [ā] with a very short [i] almost sounding like the vowel-glide [y] in words where these vowels are followed by a front vowel or a palatal semi-vowel in the next syllable. Thus Dhaṇki [boᵘlɔ] = SG., [bolyɔ] 'spoke', Dhaṇ [cāᵘlɔ] = SG. [cāldyɔ] 'walked.' Dhaṇ [ūᵘṭhɔ] = SG. [ūṭhyɔ] 'got up', Dhaṇ [gʌᵘyɔ] = SG. [gʌyɔ] 'went', etc. This is the influence of the Surti dialect which the Bhili dialects described above have escaped.

Chief Grammatical Specialities.

Treatménts of Sounds:

1. Vowels SG. [ʌ] > (1) *Bhili* [ɔ]: [dɔh] 'ten', [gɔyā] 'went', [vɔṛ] 'a bunian tree', [āpoṇ] 'we', [bɔlʌd] 'an ox', [āgɔl] 'in front', [ɔrdɔ] 'half', etc.

> (2) *Bhili* [ə]: [āvətyɔ] 'a coolie'; etc. in unaccented syllables.

> (3) *Bhili* [ā]: Bhil. [bāddā] = SG. [bʌddhā] 'all', Bhil [pāg] = SG. [pʌg] 'a foot', Bhil [kāpā] = SG. [kəpās] 'cotton', etc. This compensatory lengthening is peculiar to Bhili, not shared by Gujarati.

>(4) *Bhili* [*i*]; Bhil. [tin] = SG. [trʌṇ] 'three', Bhil. [milin]=SG. [maḷĩnɛ̃] 'having met together', etc. This is an old trait shared both by Bhili and Gujarati but whereas the latter further changed its [i] and [u] to [ʌ] in the 17th century, the Bhili did not.

2. *Consonants: SG.* [*n*] > *Bhili. Zero;* SG. [pāṇi] 'water' = Bhil. pãĩ; SG. [mãṇʌs] 'aman' = Bhili [mãhu], SG [jʌṇā] 'men' = Bhil. [jɔʔã], SG. [jʌmṇɔ] 'right (hand)' = Bhil. [jimɔ̃], etc.

3. *SG.* [*l*] > *Bhil.* [*l*]; SG. [āgʌḷ] 'in front' = Bhili. [āgɔl]; SG. [mus'ʌl] 'a pestle' = Bhili [muhɔl]; SG, [māḷī] 'a shelf' = Bhili [mālc] etc. This is the general treatment. But often SG. [l] > [r] in a few words. *e.g.* SG [ãgʌḷiyɔ] 'fingers' = Bhil. [ākṛiyā]; SG [ãglu] 'a finger' = Bhili [ākru]. A third treatment is to zero: SG [ḍoḷā] 'pupils of the eye,' = Bhili [ḍoʔā], SG [bāḷi nākho 'burn it' = Bhil. [bāy ṭakā,] etc.

4. *SG* [*l*] > *Bhili* [*n*]: SG [līdhā] 'took' = Bhili [nīdā], SG [cūl] 'a dug hearth' = Bhili [cūn], SG [cāltā] 'walking' = Bhil [cāntā], SG [holɔ] 'a dove' = Bhili [ɔnɔ], etc. This is the general treatment. But there are many words, most of which are lws, in which [l] is properly pronounced; as SG. Bhil. [kale] 'yesterday', SG [lāgɛ] 'is attached to' = Bhil [lāgɛ], etc.

5. *SG* [*s*] < *Bhili* [*h*]: SG [sāt] 'seven' = Bhili [hāt], SG [dʌs] 'ten' = Bhili [dɔh], SG [sāg] 'teak wood' = Bhil [hāg]. This is a very extensive and regular change.

6. *SG* [*h*] > *Bhili: zero:* SG [hār] 'a necklace' = Bhili [ār], SG [hathi] 'an elephant' = Bhili [āti], SG [mahinɔ] 'a month' = Bhili [mɔinɔ], SG [hʌḷ] 'a plough' = Bhil [ɔl], etc.—a very regular change.

7. *SG* [*r*] > *Bhili: zero:* SG [mārā] 'my' = Bhil [māʔā], SG [təmārā] 'your' = Bhil [tumāʔā], SG [māri nākhyā] 'killed' = Bhil [māʔi ṭākyā], SG [kʌrɛ] 'does' = Bhil [kɔɛ], etc. But [r] is clearly pronounced in many common words such as [cyār] 'four', [rupyɔ] 'a rupee', [poiri] 'a girl', [rãdys] 'cooked', etc., which may be due to the contact with the neighbouring languages.

8. *Devoicing of voiced stops.* This is a wide-spread change, though not universal: as [g] > [k]: [ākəṛyā] = SG [ãgʌḷiyɔ] 'fingers', etc.

[gh] > [k]: Bhil. [ko] = SG [ghʌr] 'a house' Bhil [koṛu] 'a horse' = SG [ghorɔ], etc.

[d] > [t]: Bhil. [tãã] = SG [dāṇā] 'corn', etc.

Other voiced stops retain their voice in tact.

9. *Voicing the unvoiced stop* is found only in words of very frequent use: as SG [moṭũ] 'big' = Bhil [moṛu], etc. This is very rare.

10. Dis-aspiration: [kh] > [k] [sokā] 'rice' = SG [cokhā], etc.

[gh] > [g] > [k] (by devoicing): [ko] = SG [ghʌr] 'a house' [koṛu] 'a horse' = SG [ghoṛɔ]; but also > [g] in lws: [vāg] 'a tiger' = SG [vāgh], [gɔ̃ũ̃] 'wheat' = SG [ghʌũ̃], etc.

[ch] > [c]: phucṛɔ] 'a tail' = SG [pũ̃chṛũ̃], [phācol] 'at the back' = SG [pachɔl], most of these cases are of compensatory aspiration—*i.e.* cases where if one syllable loses the aspiration, the other gains it.

[ḍh] > [d]: [kāḍyrā] 'took out' = SG [kāḍhya], [moṛu] 'a mouth' SG [mhɔḍhũ̃], etc.

[th] > [t]: [phāt°rnā] 'to spread' = SG [pathʌrvũ̃], a case of compensatory aspiration.

[dh] > [d]: This a very regular change: [nīdā] 'took' = SG [līdhā], [pīdɔ] 'drunk' = SG [pidhɔ], [ãdlɔ] 'blind' = SG [ãdhḷɔ], etc.

[bh] > [b]: [jīb] 'a tongue' SG. [jībh], etc.

11. Aspiration of the unaspirated stop [*p*]; [phacl] 'behind' = SG [pachʌḷ], [pholɔ] = 'that' = SG [pelɔ], [phūcṛɔ] 'a tail' = SG [pūchṛū], etc. most of these are the cases of compensatory aspiration.

Morphological facts: Only a very few morphological facts are given here due to want of space. In morphology, Bhili dialects are most closely related to Gujarati. The most striking feature which differentiates it from Gujarati is *the loss of nuter* from general use in these dialects. Isolated cases of nuter are, however, found in almost all the Bhili dialects. In nouns, these dialects, like Gujarati, have two types, the strong which differenciates gender and number, and the weak which does not. Like Gujarati there are *three cases*, the Direct to denote the subject and the object, the Instrumental locative, the old ramnant of the Old Indian Ins. and Loc. cases converged into one form, and the oblique for the purpose of using it before the post-positions. To express other relations, *post-positions* almost identical with the Gujarati ones are freely used. One thing is, however, very interesting. The Bhili has the post-position [nɛ̃] for the Dative, but none corresponding to SG [nɔ] for the genitive. The mere oblique form (which, history says, has developed from the Old Indian Genitive) without any post-position is used to show this relation. Thus, Bhili [bāhkā ko] 'the father's house,' [bahkā poirɔ] 'the father's son,' [bāhkā mɔhṛɔ] 'the father's buffalo,' [bahkā poiri] 'the father's daughter,; but [poiryo n āpā] 'give to the daughters' (dative) : This shows that the dative post-pos. [nɛ̃] is not the Loc. form of the Gen.-post, [nɔ, ni, nũ̃] as is generally supposed to be or as is often stated by Sir George, Beams, Divatia and others. In fact, [nɛ̃] is quite distinct from [nɔ, ni, nũ̃], as in Old Gujarati we find [nɛ̃] developing earlier when the Genitive post-pos. has not yet come into vogue. Also the fact that some Rajasthani dialects have [nɛ] for the dative and [kɔ,ki] for the genitive shows

that the gen. and the dat. post-positions are not genitically connected [see L S I Vol. [X, part II pp. 7.]. In *personal pronouns*, the 1st pers-nom. form [ãĩ] differs from Guj., though it is derivable from the Old Indian 'aham.' The numerals are Gujarati, the word for 'two' has no 'd' as in Hindi and Marathi, but 'b' [bɛn] like Guj. [bɛ] and Marwari. Coming *to verbs*, the Bhili preserves the old present and the old future like Gujarati and has created the continuous present, the perfect past, etc. in the same way as Gujarati has done. Even the creation of mixed verbs is made on a model similar to that of Gujarati, as SG [khāi jʌvũ] to eat away,' Bhili [vapri dīdā] 'spent away,' etc. The Grammatical details are so many and so interesting that one is tempted to describe them all here but the exegises of space does not allow us to do so.

The details connected with *vocabulary* are even more astonishing. Large lists of Bhili words derivable and not derivable from the Old Indian are ready. Some of these Aryan words are not found in the neighbouring Indo- Aryan speeches and enable us to draw important conclusions regarding the history of the Bhili languages, on matters relating to their differentiation from the neighbouring languages, their period of segregation, and the traces they show of their later contact with Gujarati and so on.

THE GUJARAT SATPURAS IN INDIAN ORNITHOGEOGRAPHY:

THE HIGHWAY OF MALAYAN FORMS TO THE WESTERN GHATS

By

SÁLIM ALI

Thanks to the munificent co-operation of the Gujarat Research Society with the Bombay Natural History Society and the Government of H. H. The Gaekwar of Baroda, it became possible in the cold season of 1945-46 to carry out the much-needed bird survey of Gujarat to which attention had been called by me in a previous issue of this journal.*

During the previous two seasons H. H. Maharao Shri Vijayarajji of Kutch, had, with his accustomed generosity and enthusiasm for natural history, sponsored similar field work in his territories. The results of this have since been embodied in my "Birds of Kutch". †

Taxonomic work on the rich and extensive material collected by the Gujarat Survey has just been completed, and a detailed report is under preparation for the Journal of the Bombay Natural History Society. This paper will collate all the data procured in Kutch and Kathiawar together with such scattered information as has been published in various journals from time to time and will form, it is hoped, a comprehensive and up-to-date account of the bird-life of Gujarat, Kathiawar and Kutch.

In the present article I propose to deal with just one aspect of the results of my investigations in Gujarat. It concerns only a small portion of the total area covered by the field work, but is considered of sufficient interest and importance to warrant special treatment. The area referred to is that fascinating tract of hilly jungle country south of the Narbada River and covered for the most part by Rajpipla State territory. In addition it includes the Songadh forests of Navsari Prant (Baroda State) south of the Tapti River together with the country adjoining it on the south, known as the Surat Dangs. This tract is bounded on the west roughly by Surat District, and on the east by the districts of Nasik and West Khandesh. Its chief interest lies in the fact that it constitutes the northern extremity of the Western Ghats which stretch practically unbroken for a thousand miles up the western side of the Indian peninsula from Cape Comorin (ca 8° N. lat.) to the Narbada River (ca 22° N.) except for a gap about 16 miles wide that cuts across them, west to east, at Palghat (ca 11° N). In addition to being the northernmost extremity

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* "Why an Ornithological Survey of Gujarat?", Journal of the Gujarat Research Society, Vol. VI, No. 3, July 1944.

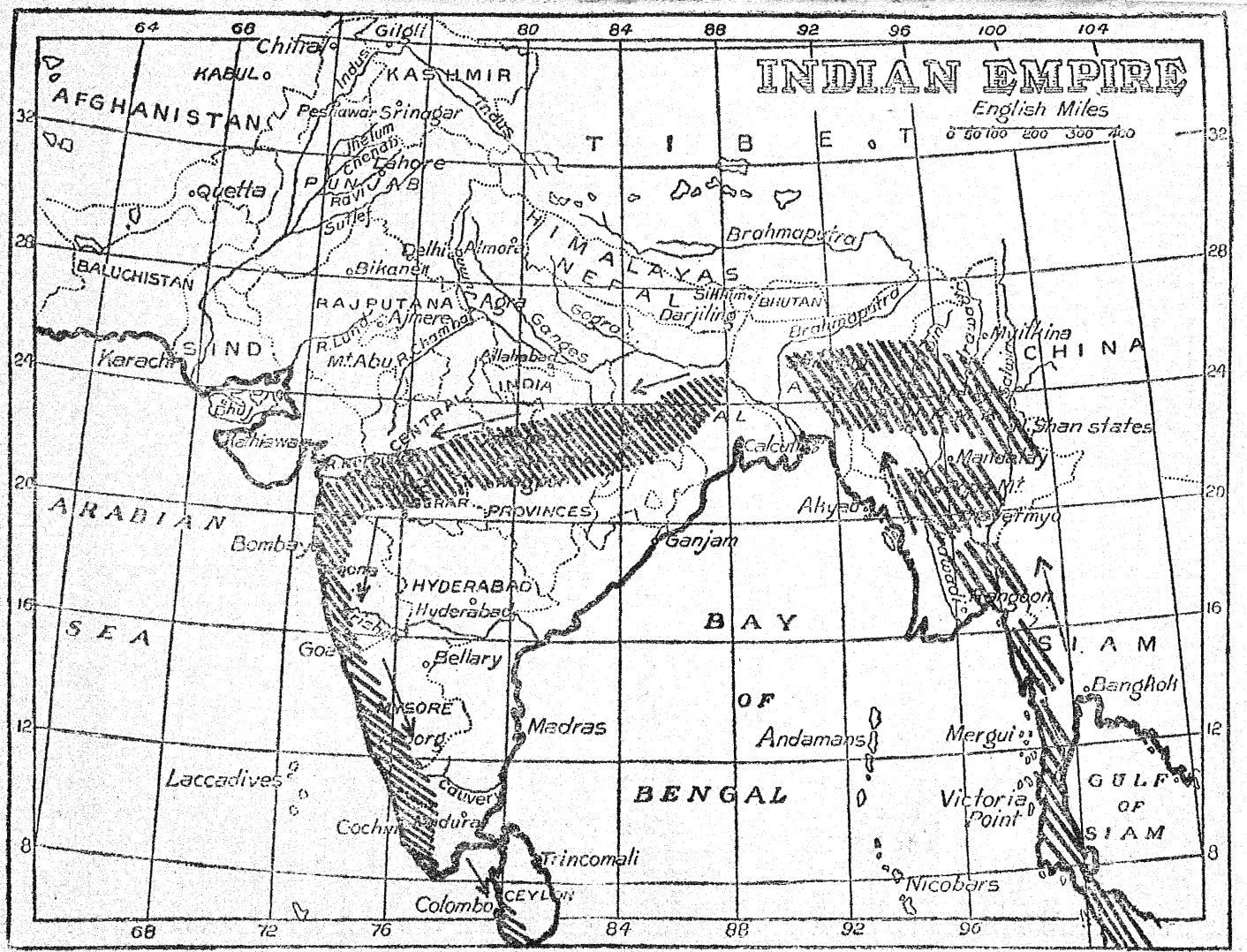
† Published for the Government of Kutch by the Oxford University Press, 1945. Reviewed in Vol. VIII, April & July 1946 issue of this journal, pp. 166-167.

of the Western Ghats the area is of interest as it dovetails into the western extremity of the Satpura Mountains which stretch almost uninterruptedly across the peninsula from here in an east-northeasterly direction through the Mahadeo and Maikal Hills and Parasnath to the Rajmahal Hills in the Santal Parganas of Bihar. From the point of view of the distribution of Indian bird-life the circumstance of the intermingling in this area of the Satpuras and Western Ghats is of the highest significance. And here a few introductory remarks seem desirable.

Ornithogeography is merely a long name for the very fascinating subject of the geographical distribution of birds. It is a study that tries to investigate the causes of uneven distribution, the breaks in its continuity, and the curious parallelisms seen in the occurrence of the same or closely allied species of birds in similar physiographical tracts often separated by hundreds of miles of country totally unsuited to the life requirements of those species. It also attempts to explain the manner and process by which such isolated populations of birds may have come into being, and how they have altered through isolation and ecological causes. In short it tries to interpret through the medium of ornithology the changes that have taken place in the physiography of the earth. The role of ornithogeography in the much wider concept of Biogeography, though important cannot perhaps be said to be pivotal. It plays an ancillary part but is nevertheless capable of lending weighty support to the findings in other branches of animals life. The presence of specialized forms of sedentary birds in isolated "pockets" is a good indicator of the former existence of suitable life conditions over extensive continuous areas which have since become widely sundered through natural causes. But data furnished solely by a study of the present-day distribution of birds, can obviously not be considered conclusive because of the special power of locomotion birds possess. Flight enables them to overcome barriers such as high mountains, deserts or rivers which effectively limit other forms of life. For example, if a species of freshwater fish specially adapted for life in torrential hill streams is discovered at the present day in widely separated areas it is more or less conclusive proof that those two areas must have had some direct or indirect connection in the past. No other explanation will work. If investigation reveals that the similarity or identity of the fish fauna inhabiting widely separated regions is repeated in other animals and plants as well, the conclusion that the areas were formerly connected becomes inevitable.

Both zoologists and botanists, working independently, have been struck by the marked general similarity that exists—in some cases even specifically—between the animals and plants inhabiting on the one hand the hilly, humid, heavy rainfall areas of south-western India (Travancore, Wynaad and, etc.,) and Ceylon, and on the other the Himalayas east of Sikkim (extending into Yunnan and S-W China) together with the hill ranges of Assam, Burma, Tenasserim, Thailand, the Malay Peninsula, Java, Sumatra, Borneo and other islands of the Archipelago.

In my paper on the birds of Travancore and Cochin[9], I showed how the meteorology of all these far-flung regions was similar owing to the trend of their hill ranges in relation to the strike of the South-West Monsoon. These ranges



The postulated route of spread of Malayan and E. Himalayan elements in the Indian fauna to the Western Ghats and Ceylon

directly intercept the moisture-laden clouds causing an ascensional movement, resulting in condensation due to the low temperatures prevailing about their summits, and precipitation in the form of rain. Thus all of them are areas of heavy rainfall and high humidity. Similarity in climate, particularly in rainfall and humidity, fosters a similar type of vegetation. What is true of vegetation is also true of the animal life associated with or directly dependent upon it. In the respective local floras and faunas of these regions many genera and even species are found to be common to them. While it is not difficult to see how similar plants and animals can flourish at the present time in these areas, it remains to be explained how they travelled over the great distances that now separate them from their primal centre of origin —in many cases Malaya and S-W China. Following Hooker and Thompson, Meinertzhagen and others, I strongly support the assumption that the majority of the many plants and animals common to the regions under discussion (Malaya, Eastern Himalayas, Travancore, Ceylon) dispersed over once continuous intervening high land or mountains which have since been broken up by geological causes, chiefly by subsidence. Subsidence may neither submerge a continuous land connection under the sea, as between South India and Ceylon, or it may iron out high land or mountains into a peneplain as has evidently happened in the case of the gap which now separates the Rajmahal Hills of Bihar from the Garo Hills of Assam, to which its flora and fauna closely approximate. There is geological evidence alternatively to point to the existence of a former mountain connection between the Rajmahal Hills and the Eastern Himalayas through Monghyr and Darjeeling. By the erosion of high land or mountains into a peneplain the continuity in the distribution of closely adapted forms of life may be just as effectively broken as by the sea, *e.g.*, between South India and Ceylon.

It is of course not necessary that all the present-day discontinuous parallel areas should have broken off from one another simultaneously. Indeed, it is more than likely that they did so differentially in time, resulting in distributional waves, as it were. To make this clearer, let us suppose that a certain species X has at present a broken or discontinuous distribution at four points A, B, C and D. Its present patchy distribution is the result of subsidence of the connecting high land at various points and the disappearance with it of the climatic and ecological conditions required by X. Or we may assume that the species originally occupied only the area A to B at a time when C to D was low country unsuited to the species's requirements. Subsequently orogenic forces upraised the land between, B, C, and D producing the requisite life conditions and enabling X to extend to D. Meanwhile the mountains connecting A with B subsided, cutting off the population on point A from that of BCD and bringing about a discontinuity in the distribution of species X. This is admittedly rather a diagrammatic explanation. In actual practice the thing is doubtless not so simple, and also the process may involve millions of years. But it is reasonable to suppose that the phenomenon of discontinuous distribution has been brought about by some such earth movements which are ceaselessly going on.

There remained to establish the actual land connection by which Malayan-East Himalayan forms reached South-West India and Ceylon. I shall return to this

later. In the meantime for the benefit of those who may not have seen my paper of the birds of Travancore and Cochin I will repeat the list of some animals belonging to different classes which are found in the Travancore area on the one hand, and then again in such widely separated localities as the Himalayas (particularly the section east of Sikkim), the Assam and Burma hills, and the Malay Peninsula and islands on the other.

Among Mammals the Nilgiri Tahr, miscalled "Ibex" (*Hylocrius nilgiriensis*) is an outstanding example. It is a mountain-dwelling goatlike animal restricted to cliffs and rocky hillsides above an elevation of 3,500 ft. in the southern section of the Western Ghats from about 10° N. southward. It is separated from its nearest relative the Himalayan Tahr (*H. jemlaicus*) found from Kashmir to Bhutan, by over 1,200 miles of country most of it completely unsuited to its existence.

The Marten (*Charronia flavigula*), another mammal, related to the Mongoose, is found all along the Himalayas, west to east, at elevations up to about 8,000 ft. Through the Eastern Himalayas it extends southward through the Assam and Burma hills into Malaya and Sumatra. It also occurs in South China and in Amurland. With an enormous gap in its distributional range this Marten reappears in the higher portions of the Western Ghats south of the Nilgiris, and in the higher hill ranges of Travancore. It is also said to occur in the hills of S. W. Ceylon.

Among Reptiles a good example is furnished by the Flying Lizards of the genus *Draco*. This genus is represented by 3 species from Assam to Yunnan and south through Thailand, Burma and Tenasserim to Malaya. A fourth species, *Draco dussumieri*, occurs in the heavy rainfall areas of Travancore and Malabar.

Among Batrachians the beautiful little Tree Frogs of the genus *Ixalus* have a discontinuous distribution almost identical with that of the Flying Lizards. The worm-like *Ichthyophis monochrous* inhabits Java, Borneo, Malaya, Sikkim. Also the Western Ghats, where it has been obtained in Malabar and at Khandala.

But perhaps the most striking instances of the phenomenon of Malayan elements in the fauna of peninsular India, and particularly in the southern section of the Western Ghats, are furnished by the highly adapted freshwater fishes of these widely separated regions. In a series of lucid papers[5-8] Dr. Sunder Lal Hora, Director of the Zoological Survey of India, enumerates a number of such specialised forms common to hill streams in both these regions. He discusses the factors influencing the dispersal of torrential fishes, and the probable route and manner by which Malayan and East Himalayan forms may have reached S-W India. In the course of his studies, Dr. Hora discovered certain of these restricted species at various points along the Satpuras which they could not possibly have reached unless there had been a chance of the drainage of these areas to intermingle at some period either through earth movements or river capture, or both. Torrential fishes by their very limited power of migration due to their narrowly adapted physiology, offer far more conclusive evidence of zoogeographical relationships than almost any other group of animals. Therefore, from the pattern of their

present-day distribution Dr. Hora has been led to postulate that the Satpura trend of mountains extended as a fairly pronounced and contiguous ridge between the Assam Himalayas on the east and the Gujarat portions of the Western Ghats in the west, even up till geologically recent times, and formed the main highway for the westward migration, or dispersal, of Malayan and S-E Asian forms to and across peninsular India. He infers that the present gap separating the Garo Hills of Assam from the Rajmahal Hills (the north-eastern extremity of the Satpuras) is in all probablity quite a recent feature of the physiography of India, and that it was only with its appearance on the scene that further incursion of Eastern Himalayan elements ceased.

A number of peculiar genera and species of resident birds found in the Travancore/Cochin area and then again in the Assam Himalayas and south to Malaya were enumerated in my Travancore paper. By a series of sketch maps I was there able to show the striking discontinuity in their distribution in a graphic way. Since the publication of that paper intensive field work in Mysore and other parts of the Peninsula has considerably extended the northern limit of several species till then considered to be restricted to the Travancore area.

The following are some of the discontinuously distributed forms in regard to which subsequent work in Mysore and the recent Gujarat Survey have provided some new and significant data;

Hemicircus canente: The Heart-spotted Woodpecker.

A dainty little black and buff coloured crested woodpecker inhabiting moist deciduous forest on the verge of evergreen jungle, or what may be termed the intermediate zone between the deciduous and evergreen types.

The typical race of this woodpecker, *H. c. canente*, occurs in Assam, Burma, Malay Peninsula, Thailand, Cochin China, and Annam. A second race, *H. c. cordatus*, —somewhat smaller in size and with a smaller bill—was hitherto considered as confined to the Malabar zone of S-W India. Seventy years ago Jerdon had recorded it from the "Chanda forest" in the Central Provinces, but since then it had apparently been lost sight of there. Within the last 10 years, however, it was authentically recorded for the first time in the wooded hills of the Tulsi Lake catchment area in Salsette (near Bombay). The Gujarat Survey extended its range still further north to the northern extremity of the W. Ghats, having procured specimens in its typical biotope, in the Sondagh forests of Navsari Prant.

Dryocopus javensis: The Great Black Woodpecker.

A magnificent black woodpecker, the size of the Jungle Crow, with white underparts from breast down. The male has a brilliant crimson forehead, crown and nape, and crimson cheeks. In the female the crimson is confined to the nape only. It inhabits mixed evergreen and deciduous forest—more or less of the type designated by Champion[2] as Tropical Moist Deciduous—and keeps to the trunks of large trees.

The typical race of this woodpecker, *D. j. javensis*, and two others are found in the Malay Peninsula and Archipelago. A fourth race *D. j. feddeni* occurs in Burma north to the Chin Hills (as far as known at present). The fifth race, *D. j. crawfurdi*, distinguished from the Burmese by having a broad white band on the rump and no white in its black wing feathers, occurs in the Western Ghats. Till quite recently it was considered as restricted to the Malabar zone, the northernmost record being from Belgaum. Four years ago it was discovered for the first time at Suriamal in the Nasik District. The Gujarat Survey has extended its distribution still farther north, having met it in the Songadh forests of Navsari Prant just south of the Tapti River in the intermingling zone of forested foothills of the Western Ghats and Satpuras. This woodpecker has so far not been recorded further east along the Satpuras nor from the Chota Nagpur area, but I feel confident that a thorough investigation will reveal its presence in the appropriate biotope there.

Alcemerops athertoni: The Blue-bearded Bee-eater.

An enlarged edition of the Common or Small Green Bee-eater. Size between the Myna and the Bulbul. Grass green above, buff below with greenish longitudinal streaks on breast. Long, slender slightly curved black bill. A tuft of blue feathers under the chin, pendant like a beard when the bird swells its throat in calling, provides a good recognition mark.

This species inhabits foothills country in evergreen and moist deciduous forest biotope, upto an elevation of about 5,000 ft. It is found in the Himalayas from about Dehra Dun to east and south Assam, E. Bengal, Chittagong, the Vizagapatam Ghats, Burma, Thailand. It occurs also in S-W-India, but until recently was known only from Travancore to Belgaum. The Gujarat Survey extended its northern limit to the Tapti River. It probably also occurs somewhat north of this in Rajpipla territory, up to the Narbada. Its discovery in the area of the Gujarat Satpuras is interesting since within the last few years it had also been recorded at and around Panchmarhi in a more easterly section of the range providing another milestone on the postulated highway of Malayan and East Himalayan forms to S-W India. It has not yet been recorded from the Chota Nagpur—Rajmahal Hills areas, but on ecological considerations its discovery there seems only a matter of time and closer investigation.

To these four examples taken from my Travancore paper the following may now be added. In each case their discovery in the Rajpipla-Songadh-Dangs area by the Gujarat Ornithological Survey has extended their previously known northern limit considerably. The recent field work has also definitely shown that the Tapti river forms the northernmost boundary on the western side of the Peninsula for many of these forms, while others extend up to the Narbada. Some of them are known to occur eastward along the Satpuras (*e.g.*, at Pachmarhi, Parasnath and elsewhere, and also in the Chota Nagpur-Rajmahals area) and I am confident that a careful investigation along this line of hills will disclose other pockets of parallel physiography containing vegetation of the moist deciduous type and

harbouring isolated relict populations of these far-flung Malayan-East Himalayan species.

Tephrodornis gularis : The Large Wood-Shrike

The Malabar race, *sylvicola*, is described by Stuart Baker (Fauna of British India—Birds, Vol. ii, P. 311) as occurring up the western side of the Peninsula (W. Ghats) from the extreme south "almost to Bombay city". Mr. Whistler remarked (Eastern Ghats Survey, *Journal of the Bombay Natural History Society*, Vol. xxxvi, p. 338) that he had failed to trace any record of it more north than the jungles west of Belgaum (Laird's) !

By procuring a specimen at Waghai in the Surat Dangs therefore, the Gujarat Survey extended its distribution considerably north, to the intermingling zone of the Western Ghats and the Satpuras. The closely allied race *T. g. pelvica* is resident in the Eastern Himalayas and thence southward through the Assam and Burma hills to the southern part of the Malay Peninsula where it meets the typical race *T. g. gularis*.

The East Himalayan race (*pelvica*) has recently been procured in the Vizagapatam Ghats (Humayun Abdulali, *J. B. N. H. S.*, 45, 337) but the species is so far unrecorded from anywhere along the Satpuras or from the Chota Nagpur-Rajmahal Hills area. Careful field work will doubtless reveal its presence in suitable biotope here. It inhabits dense tall evergreen or moist deciduous forest and mixed bamboo jungle.

Hemipus picatus : The Pied Flycatcher-Shrike

This species is represented in Ceylon by the endemic race *leggei*. The black-backed Indian race is found according to the Fauna (ii, 306) in S-W India "from Cape Comorin to Bombay". The Gujarat Survey recorded this bird in the Surat Dangs thereby considerably extending its hitherto known distribution up the western side of peninsular India, to the contact zone between the Satpuras and Western Ghats. It may be mentioned that W. Davidson had obtained it in the Satpuras in West Khandesh in about 1880 (*Stray Feathers*, x, 301) and it was also recorded from the Singbhum area in Chota Nagpur at the eastern extremity of the Satpura trend ca 1877 (Ball, *S. F.*, vii, 210). The Eastern Ghats Survey obtained it in the Vizagapatam Ghats but nowhere south of this on the eastern side of the Peninsula.

A third race of this species—*H. p. capitalis*—distinguishesd by its brown instead of black back, occurs in the Himalayas from Kumaon to E. Assam, the Assam and Burma hills, Thailand, Yunnan, Annam, Cochin China, and etc. The inference is irresistable that the Satpura Trend has served as highway for the dispersal of this species from the Eastern Himalayas to Travancore and Ceylon.

Pericrocotus flammeus : The Orange Minivet.

The distribution of the Orange Minivet according to the Fauna (ii, 322) is "South western India from Khandala to Cape Comorin, Mysore Nilgiris, Palnis and

adjacent hills; Ceylon". The Gujarat Survey, by specimens and sight records in the Songadh forest and Surat Dangs has extended its northward distribution in the Western Ghats to almost the Narbada River and the westernmost extremity of the Satpura range. In peninsular India the Orange Minivet was hitherto known only from the Western Ghats. Only recently the same race, *P. f. flammeus*, seems to have appeared on the eastern side in the south of the Peninsula. The Eastern Ghats Survey procured specimens in the Chitteri and Shevaroy Hills (ca 12° N x 78° E)

H. G. Deignan (Races of the Scarlet Minivet, *Auk* Vol. 63, 1946, p. 533) following Stresemann, shows that *Pericrocotus speciosus semiruber* described by Whistler and Kinnear as a new race from the northern section (Vizagapatam) of the E. Ghats, is really a subspecies of *flammeus*. This species as now understood, has an overall distribution in the western and eastern Himalayas, Burma, Thailand, Malay Peninsula and islands, Borneo, Philippines, etc.

Although the recent revision by Deignan combines the *speciosus* group (Scarlet Minivets) with the *flammeus* group (Orange Minivets) and a certain amount of confusion is thereby produced in the older records, *some* race of this Minivet definitely occurs as a resident at Pachmarhi, Betul, Balaghat and other places along the Satpuras again suggesting that this may have been its route of dispersal from the east. The populations and ranges of the various races within Indian limits, however, need to be carefully worked out.

Aethopyga siparaja: The Yellow-backed Sunbird.

This species of which the males are distinguished by a crimson chin and throat, is found in moist deciduous or evergreen forest ghats country. It may be recalled that in my paper on Travancore birds[9] I doubted the correctness of the distribution of the race *vigorsii* given in the Fauna (iii, p. 382) as extending from Bombay and Poona to the south of Travancore since I myself, as well as other previous competent observers, had failed to come across it in Travancore or Chocin. The Gujarat Survey has now extended its distribution much farther north than previously known, *i.e.*, to north of the Tapti and almost up to the Narbada River—the intermingling zone of the Western Ghats with the Satpuras. On a closer acquaintance with the ecology of this Sunbird I now see no cogent reason why it should not occur in Travancore. A race of this species, *AE.s. seheriae*, which occurs in the E. Himalayas and also in the Chota Nagpur area has been found on Lougher, ca 2000 ft. (Satpuras, Balaghat Dist., C. P). Other races are found in the Assam hills, Yunnan, Burma, Thailand, Tenasserim, Malay Peninsula, Java and other islands. In the Himalayas it extends as far west as Kumaon.

To the list may also now be added the Trogon (*Harpactes fasciatus*) which occurs in Ceylon and whose distribution on the western side of the peninsula the Fauna (iv, 317) gives as: "Travancore, the Malabar and South Bombay Presidency coasts east to the hill ranges of Mysore etc." A specimen of this trogon was first obtained in the Surat Dangs by Humayun Abdulali in 1940. The Gujarat Survey has since confirmed its regular occurrence in this area. It is

already known from the Chota Nagpur area, so its discovery in the Satpura mountains which span these two points, seems highly probable, and only a matter of careful investigation.

So much for the piecemeal evidence adduced from the Gujarat Survey.

There are 2 old records in the literature which have always been looked upon with a certain amount of suspicion but which in the light of recent findings do not appear to be so improbable. A specimen of the Southern Tree Pie (*Dendrocitta leucogastra*) was recorded by McMaster from the Gawilgarh Hills near Chikalda (Amraoti Dist., Berar) about 80 years ago, and also the Black Bulbul (*Microscelis psaroides ganeesa*). These records have never been repeated in the intervening years. Stuart Baker (F. B. I., i. 52) disposes of the former glibly by saying "apparently a straggler only", but in the case of so sedentary a species whose known distribution at present is restricted to "Southern India from South Travancore to the Wynaad" it is not easy to understand why or how it could have straggled so far north and then east. Since it is not doubted that McMaster's specimen actually came from the Gawilgarh Hills, it seems to me reasonable to suggest that it may represent a population that is now either extinct, or that the species may still be tucked away in some isolated pockets of the requisite humid biotope at remote points on the Satpuras, possibly extending eastward into the Bastar, Chota Nagpur and Rajmahal areas. Should this prove to be the case it will be worthwhile to examine more closely and determine the true taxonomical relationship between this species and the Black-browed Tree Pie (*Dendrocitta frontalis*) of the Eastern Himalayas, Assam and N. Burma hills.

As regards *Microscelis psaroides*, its known range at present is from Ceylon through the S. India hills northward along the Western Ghats to about Matheran. The only other area in the southern peninsula whence it has been recorded is the Shevaroy Hills. It occurs in the Himalayas west to east, the Assam hills, Burma south to Tenasserim, Yunnan and Thailand, in suitable biotope, (*i.e.*, evergreen and moist deciduous forest) breeding in the hills mostly between 2000 and 8000 ft.

If McMaster's record from the Gawilgarh Hills—a section of the Satpuras—is correct, then it is certainly an indication that this species *may* be found farther east along this trend, and also in the Chota Nagpur-Rajmahal areas whence it is so far unrecorded. Careful field work in the relevant areas is called for.

I would here like to mention a third species, not actually met with by the Survey in the Gujarat Satpuras, but of which the known distribution is suggestive. This is

Athene blewitti : The Forest Spotted Owelet.

Essentially a bird of deep forest. First described from "Phooljan State" (Phuljhar) in Chota Nagpur. It has also been recorded from W.Khandesh Dist., about 600 miles to the west and therefore presumably extends throughout the

length of the Satpuras in suitable spots. Little is known of the distribution of this owl; how far N-E of Phuljhar it extends and how far S-W of Kandesh needs to be determined.

The data relating to the distribution of birds obtained by the ornithological surveys of the Travancore, Cochin and Mysore areas of S-W-India and of Gujarat and the Eastern Ghats, if studied in the context of Dr. Hora's theory of the Satpura trend being the highway for the spread to the Western Ghats of Malayan and East Himalayan forms, opens up a fascinating line of field research on the zoogeography of India. It is to be hoped that workers in other classes of animal life will also examine the implications of this theory with the care it deserves and present relative data bearing on the subject from their own special groups.

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નોંધ

આ મંડળની બારમી વાર્ષિક સભા શનિવાર તા૦ ૧૩ મી માર્ચ ૧૯૪૮ ના દિવસે ભરવામાં આવી હતી. પ્રમુખપદે ન્યાયમૂર્તિ સર હરસિદ્ધભાઇ દીવેટીઆ હતા. ઘણા સભ્યો પણ હાજર હતા. સર પુરૂષોત્તમદાસ ઠાકુરદાસ, સર મણીલાલ નાણાવટી, સર ખેરામજી કરંજીઆ, દી. બા. કૃષ્ણલાલ ઝવેરી એ ઉપરાંત આશરે બીજા પચાસ સભ્યોની હાજરીમાં કાર્યક્રમ શરૂ કરવામાં આવ્યો હતો.

મહાત્મા ગાંધીજીના અવસાન પ્રસંગે નીચેનો પ્રસ્તાવ શોક અને શાન્તિ સાથે પસાર કરવામાં આવ્યો હતો:—

"સત્ય, પ્રેમ, અને અહિંસાના પ્રેરક, હિંદની સ્વાતંત્ર્યના વિધાયક, લોકપિતા, મહાત્મા ગાંધીના ક્રૂર અવસાનથી માનવતા અને સંસ્કૃતિને જે અમોઘ ખોટ પડી છે તેને માટે આ સભા શોક દર્શાવે છે. મહાત્માજીએ મહાગુજરાતમાં જન્મીને, મહાગુજરાતની સંસ્કૃતિનો અને માતૃભાષાનો વિકાસ સાધીને, સમાજસેવાનો માર્ગ દર્શાવીને, અને સત્યશોધકના પ્રયોગોદ્વારા સંશોધનનો સાચો પાયો નાંખીને મહાગુજરાતની ભૂમિને સદાને માટે પૂનિત કરી છે. એ મહાપુરૂષને આ સભા અંજલિ આપે છે."

આ પ્રસ્તાવની નકલ યોગ્ય સ્થળે મોકલવાની મંત્રીને સત્તા આપે છે."

ત્યાર પછી વાર્ષિક અહેવાલ અને હીસાબ પસાર કરવાની દરખાસ્તના અનુમોદનમાં ઉપપ્રમુખ શ્રી ચોપટલાલ શાહે નીચેના વિચારો દર્શાવ્યા હતા :—

છેલ્લી વાર્ષિક સભા પછી આપણે આજે મળીએ છીએ તે સમયના ગાળામાં હિંદમાં વિપ્લવમય ફેરફારો થયા છે. ૧૫ મી આગસ્ટે હિંદને મળેલી સ્વતંત્રતા એ પૃથ્વીના ઇતિહાસમાં અમર અને અજોડ ઘટના ગણાશે. હિંદના મુખ્ય પ્રધાન અને વૈજ્ઞાનિક સંશોધનખાતાના પ્રધાન પંડિત નેહરૂના શબ્દોમાં કહીએ તો "સ્વાતંત્ર્યની સાથે આપણી જુમ્મેદારીઓ અને બોજો વધતાં જાય છે; તેમના ઉકેલને માટે સંયમપ્રધાન અને કર્તવ્યનિષ્ઠ પ્રજાભાવનાની જરૂર છે. દેશમાંથી ગરીબી, અજ્ઞાન અને રોગગ્રસ્ત સ્થિતિ દૂર કરવાનું કામ ઘણું અગત્યનું છે." તેમાં આવશ્યક આયોજન અને સંશોધનના કાર્યોમાં આપણું મંડળ ઘણું કાર્ય સાધી શકે છે. અને તે સાધવાના પ્રયત્નો કેટલા અંશે સફળ થાય છે તે નિર્ણય કરવાનું કામ પ્રજાજનોને માથે છે. પરંતુ એક મંડળ તરીકે આપણી ફરજો દેશના સ્વાતંત્ર્યને લીધે વધી છે એનો સ્વીકાર કરીને આપણે વધારે તૈયારી કરવી જોઇએ અને મહાગુજરાતની ઉન્નતિ અને પ્રગતિ સંશોધનદ્વારા સાધવાને માટે કટિબદ્ધ રહેવું જોઇએ.

સમસ્ત પૃથ્વીને અને મહાગુજરાતને પૂજ્ય મહાત્મા ગાંધીના અવસાનથી જે મોટી ખોટ પડી છે તે વિષે આ સભાએ શોક ઠરાવ પસાર કર્યો છે. તેથી વધારે કહેવાનું ન હોય.

ઘણી વ્યક્તિઓ, મહાપુરૂષોએ, અને સંસ્થાઓએ તેમના સંબંધી ઘણું લખ્યું છે, પ્રસિદ્ધ કર્યું છે; તે છતાં તેઓ એક ભોટા સંશોધક હતા તે વિષે બે શબ્દો કહેવાની જરૂર લાગે છે. તેમણે પોતાની આત્મકથાને સત્યના પ્રયોગોની કથાનું ઉપનામ આપીને જીવનમાં પ્રયોગ અને પ્રયોગાત્મક સંશોધન–વૃત્તિની અગત્યતા સુંદર રીતે સિદ્ધ કરી છે. તેમની શોધક વૃત્તિને લીધેજ તેમણે જીવનના સર્વ પ્રદેશોમાં વિચાર અને કાર્યની સફલતા સાધી હતી. નિડરતા અને વિચાર સંયમથી તેમણે દેશના અને વિશ્વના અનેક પ્રશ્નોનો ઉકેલ આપ્યે છે, અને સત્ય પ્રેમ અને અહિંસાના સર્વોત્કૃષ્ટ ઉપાસક અને વિશ્વનેતા તરીકેની તેમની ખ્યાતિ પ્રસિદ્ધ થઇ છે તેનું એક કારણ આ સત્યશોધકની વૃત્તિ હતી એવો મારો નમ્ર અભિપ્રાય છે. તે આપણે તેમનાજ શબ્દોમાં સારી રીતે સમજી શકીએ એમ છે:—"મારા પ્રયોગોને વિષે હું કોઇ પણ પ્રકારની સંપૂર્ણતા આરોપતોજ નથી. વિજ્ઞાનશાસ્ત્રી જેમ પોતાના પ્રયોગો અતિશય નિયમસર, વિચારપૂર્વક, અને ઝીણવટથી કરે છે છતાં તેમાંથી નિપજાવેલાં પરિણામોને છેવટનાં ગણાવતો નથી, અથવા તો એ એનાં સાચાંજ પરિણામ છે એ વિષે પણ સાશંક નહિં તો તટસ્થ રહે છે તેવોજ મારા પ્રયોગોને વિષે મારો દાવો છે. મે ખૂબ આત્મનિરીક્ષણ કર્યું છે, એકએક ભાવને તપાસ્યો છે, તેનું પૃથક્કરણ કર્યું છે. પણ તેમાંથી નીપજેલાં પરિણામ એ સહુને સારૂ છેવટનાંજ છે અથવા તો એજ ખરાં છે એવો દાવો હું કોઇ દિવસ કરતો નથી."—આત્મકથા. પૃ. ૫

ગાંધીજી એક પ્રખર વૈજ્ઞાનિકને શરમાવે તેવી પોતાની શોધક તરીકેની વ્યાખ્યા આપે છે. સત્ય એટલે કલ્પેલું સત્યજ નહીં, પણ સ્વતંત્ર ચિરસ્થાયી સત્ય—એટલે કે પરમેશ્વરજ,... "સત્ય મને જડ્યું નથી, પણ એને શોધવાને અર્થે જે વસ્તુ મને પ્રિયમાં પ્રિય હોય તેને ત્યાગ કરવા હું તૈયાર છું, અને એ શોધરૂપી યજ્ઞમાં આ શરીરને પણ હોમવાની મારી તૈયારી અને શક્તિ છે એવો મને વિશ્વાસ છે."

ગાંધીજીએ દેશસેવા અને સમાજસેવાના આદર્શો આપણને આપ્યા છે. તેનું અનુ–પાલન કરવાનું કાર્ય આ મંડળ યથાશક્તિ પ્રયત્ન કરી રહ્યું છે. સંશોધન સમાજ અને પ્રજાને ઉપયોગી થાય એ દૃષ્ટિથી અને દેશમાંથી અનારોગ્ય અને રોગગ્રસ્ત સ્થિતિ દૂર કરવાને માટે અનેક પ્રયત્નો મંડળની મેડીકલ કમિટિદ્વારા થાય છે; ગુજરાતીઓની આરોગ્યસ્થિતિ અને ખોરાક વિષે ઘણું સંશોધન વર્ષોથી ઘણા ખર્ચે ચાલુ રાખવામાં આવ્યું છે: અને આરોગ્ય કેન્દ્રો તેમજ પાંડુરોગ જેવા દુષ્ટ રોગોના વિષે સંશોધન સર પુરૂષોત્તમદાસ, ડોકટર ગોધ અને બીજા અન્ય દાતારો અને ડોકટરની મદદથી ચાલુ રહ્યું છે. આ મંડળના કાર્ય વિષે વધારે ઉલ્લેખ વાર્ષિક એહવાલ જે તમારી સમક્ષ મુકવામાં આવ્યો છે તેમાં કરવામાં આવેલ છે.

આ પ્રમાણે આરોગ્યકેન્દ્ર જેવી નવી પ્રવૃત્તિ હાથ પર લેતાં મંડળના વાર્ષિક હિસાબમાં ખોટ આવી છે તે આપણા રીપોર્ટ ઉપરથી આપ જાણી શકશો. આશા છે કે આ ખોટ પૂરી કરવાને બહુ વખત નહિં લાગે. ગાંધીજીના શબ્દમાં કહીએ તો જાહેર સંસ્થા એટલે લોકોની મંજુરી અને લોકોનાં નાણાથી ચાલતી સંસ્થા. એ સંસ્થાને જ્યારે લોકોનાં નાણાંની મદદ ન મળે ત્યારે તેને હસ્તી ભોગવવાનો અધિકારજ નથી. પ્રતિવર્ષ મળતો ફાળો તે સંસ્થાની

લોકપ્રિયતાની અને તેના સંચાલકોની પ્રામાણિકતાની કસોટી છે. અને લોકસંસ્થાએ એ કસોટી ઉપર ચડવું જોઇએ એવો મારો અભિપ્રાય છે.

અમારી નાણાંની મૂશ્કેલીઓ હોવા છતાં પણ અમારાથી બનતો પ્રયાસ અમે કરીએ છીએ. સમાજ સેવાની દૃષ્ટિએ આરોગ્યના સંશોધન ઉપરાંત આરોગ્યવિષયક પુસ્તકો મફત અથવા પત્તર કિંમતે વહેંચીએ છીએ. તે ઉપરાંત સંસ્કાર અને ઇતિહાસના સંશોધનને માટે તે વિષયની સમિતિઓ ધ્યાન આપે છે. ભાષાવાર પ્રાંતોનું બંધારણ નકકી થાય ત્યારે ભાષા પ્રમાણે ગુજરાતના સીમાડાના કયા પ્રદેશો ભાષા પ્રમાણે ગુજરાતમાં આવવા જોઇએ એ દિશામાં સંશોધન ડૉ. ત્રંબકલાલ દવે કરી રહ્યા છે. તાપી અને નર્મદાની ખીણોની સંસ્કૃતિની સીમાઓ વિષે શ્રી અમૃત વસંત પંડ્યાને પણ નાણાકીય મદદ આપીને કામ ચલાવવામાં આવ્યું છે. શ્રી. પંડ્યાના ઉત્તમ લેખ માટે તેમને ચંદ્રક આપવાની વિધિ પણ આજે થવાની છે.

સંશોધનવૃત્તિનો પ્રચાર કરવો અને દેશના પ્રશ્નોના ઉકેલમાં સંશોધનવૃત્તિનો ઉપયોગ વધારે દૃષ્ટિમાં થતો જાય એ ઇષ્ટ છે. એ દૃષ્ટિએ મને જણાવતાં આનંદ થાય છે કે શ્રી હરભાઇ ત્રિવેદી તરફથી ભાવનગરમાં આ મંડળની શાખા સ્થપાઇ છે અને ત્યાં શાખાના સભ્યો નિયમિત રીતે મળે છે અને સંશોધનના પ્રશ્નોનો વિચાર ભાષણો વગેરે દ્વારા કરે છે. જુનાગઢ અને રાજકોટમાં આ મંડળની શાખાઓ ઉઘડવાના ભણકારા વાગે છે. આપણા પ્રમુખશ્રી સૌરાષ્ટ્રના વરિષ્ટ ન્યાયાધીશનું સ્થાન દીપાવે છે તે પ્રસંગે આજે આપણે અભિનંદન આપીએ છીએ તેની સાથે આશા રાખીએ કે સૌરાષ્ટ્રમાં સંશોધન પ્રવૃત્તિને તેઓશ્રી ઉત્તેજન આપે અને મંડળના કાર્યને વિસ્તારે.

The Gujarat Research Society invites applications from trained graduates possessing the B.T. degree for conducting a research on the comparative value of the training given in ordinary and Montessori schools in the province. The person selected will have to test about 500 children individually which may take about 10 months' time. A grant will be made to cover the expenses of the research. Expert guidance will be arranged for and the teacher will be allowed to register his name for the degree of M.Ed. by thesis. Applications should reach the Secretary, Gujarat Research Society, 46-48, Esplanade Mansion, Mahatma Gandhi Road, Bombay 1, by 20th June 1948.

REVIEWS

THE GATHAS OF ZARATHUSTRA—TEXT WITH A FREE ENGLISH TRANSLATION—BY IRACH J. S. TARAPOREWALA, B.A., PH.D., BAR-AT-LAW. PRICE RS. 3. AVAILABLE FROM THE AUTHOR 7, VATCHAGANDHI ROAD, GAMDEVI, BOMBAY 7. ALSO IN GUJARATI.

Dr. Taraporewalla, who has acquired great reputation as a Philologist, having to his credit two editions of "Elements of Science of Language" has now been concentrating on the religious books of Zoroastrians. This edition of the Gathas of Zarathushtra in English gives the original Avesta texts with proper diacritical marks for correct pronunciation. The depth of his knowledge of the sacred languages of the Zoroastrian Scripture and the sincerity of his spiritual opinions have added new weight and efficacy to the book of sacred prayers. The example of his commentary on the following mantra—Ahuna Vairya will abundantly illustrate this characteristic of the author:

As Lords-Temporal work their will on Earth,
So by their gathered Asha Teachers wise;
The gifts of Vohu-man' come as reward
For deeds done out of Love for Lord of Life:
Ahura's Xshathra surely cometh down
To him who serves with zeal his brother meek.

In comparing the Zoroastrian and the Hindu modifications of the ancient religions of the Aryans, he shows that Avestan Asha and the Vedic Rita (universal law of truth), so also Vahu-mana and the Good-mind and all embracing Love and Kshathr and the Path of Service (Sewa Marga) bear close affinity. According to the author the central teaching of his religion is that a man should reach his full stature and be as his father in heaven and attain the fullest and the most perfect use of the gifts of the head, the heart and the hand, which are to be in three paths of God—of knowledge of love and of service.

The book is extremely useful for the study of the religion of the Parsis, whose cultural and industrial contribution to the greatness of Maha Gujarat cannot be overrated. No Parsi can do without both the Gujarati and English versions of the Gathas which have been so well edited by the author.

P. G. S.

A STUDY OF PANCHAYATS IN MADRAS—BY K. JAYARAMAN, M.A., M.LITT. PRICE RS. 5. PUBLISHED BY INDIAN SOCIETY OF AGRICULTURAL ECONOMICS, BOMBAY.

The study of the Indian Agricultural Economics has received new impetus since Sir Manilal Nanavati was elected its President on his retirement from the Deputy Governorship of the Reserve Bank of India. His masterly book, "The Indian Rural Problem" now in the third edition has laid the founda-

tion of Indian Agricultural Economics. The proceedings of the annual conferences of the society have, year after year, supplied valuable material to the students of this much neglected but most important subject. The book "Agrarian Reforms in Western Countries" provides an appreciative introduction for the study of the agrarian reforms attempted in recent years in different parts of the world. Now that freedom has dawned on this country we may look forward to the real economic emancipation of the Indian farmer. It was the experience of most of the European countries that the mass of the agriculturists were ground down in poverty for centuries by the feudal landlords who were protagonists of monarchy which maintained them, and that the agricultural reform movement was born only after these countries acquired independence.

Sir Manilal who has a vast and unique experience of rural life of Gujarat and Kathiawar considers three institutions as essential for the progress of the village life. A school as a centre for education and culture, a co-operative society for economic development, and a panchayat for social health and political organisation. He had planned a comprehensive study of the village panchayats in India and the present volume on Madras is the first of the series. The book is so well written and so full of information that it will prove useful to the students of the subject throughout the country including Gujarat.

The Madras report gives documentary proofs of the early village communities found in the celebrated Uttaramerur inscriptions in the Chingleput district. The epigraphic evidence points to a continuous rural life in the locality. The ancient village community worked through at least six committees—1) Annual Committee; 2) Garden Committee; 3) Tank Committee; 4) Gold Committee; 5) Committee of Justice and 6) Panchavara Committee for general supervision. The modern village panchayat has, however, to have a more comprehensive scope than its ancient counterpart. It has to aim at the self-sufficiency of the village and works for multipurpose activities which though numerous are all essential, *e.g.*, supervision of education popularisation of the correct ideas on sanitation, health, maternity and child welfare, non-pollution of the sources of drinking water, village conservancy, collection of vital statistics, etc. The book is carefully compiled, and out of the eight chapters, the one on the future of the panchayats is both thought-provoking and stimulating. The questions of training the technical and specialised staff required in spheres of agriculture, public health, education and communications and retaining them in rural areas are the most important ones affecting the future of village panchayat in this ancient and. No effort is too small for this purpose.

P. G. S.

MARRIAGE HYGIENE, VOL. I, NO. 3. FEBRUARY, 1948. DR. A. P. PILLAY, WHITEAWAY BUILDING, HORNBY ROAD, BOMBAY. RS. 12 PER ANNUM.

This quarterly journal is now published as International Journal of sex and sex problems. In the modern life, sex plays ani mportant role and it is useful to see the sex problems dealt with in a scientific way and to find a Bombay journal reaching international importance. It would be useful for these research workers to keep in mind

that Indian ancient writers have left a valuable mine of information and regarded "Kama" as one of the most important factors in human activities. Even Jung who had visited India wrote in his "Modern Man in Search of a Soul" that " our studies of sexual life, originating in Vienna and England, are matched or surpassed by Hindu teachings on this subject." The modern writers cannot afford to neglect the knowledge already available in ancient Sanskrit literature and it is desirable that a section of the journal should be devoted to this aspect.

P. G. S.

ACKNOWLEDGMENTS

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GEOLOGICAL EVOLUTION OF MAHA-GUJARAT

By

DR. R. N. SUKHESWALA

Section I

PHYSICAL FEATURES

(*a*) *Natural Regions:*

The country of Maha-Gujarat (including as it does Cutch and Kathiawar) is situated roughly between Latitudes 20° and 25° north and Longitudes 69° and 75° east. It lies mainly in the Torrid zone and encompasses an area of about 64,000 sq. miles. The Damanganga river forms the southern boundary while to the north lies the Great Rann with the Aravallis as marking its northern limits. The eastern frontiers are guarded by the mountainous districts of the Vindhya, the Satpura and the Sahyadri; while to the west is seen skirting the Arabian Sea (Map I).

The province of Gujarat shows three well-marked natural regions: (*a*) the flat plains of Gujarat extending along the western border from Daman in the south to as far as Cutch and the Aravallis in the north; (*b*) the rocky terrains of Cutch and Kathiawar which are in turn covered by the Sub-Recent deposits of the Gulfs of Cambay and Cutch; and (*c*) the highland region of the east made up of the Aravallian foothills in the north, the Satpura Range in Rewakantha and the Sahyadri Range in the south.

The above natural divisions show variations not only in their geographical and climatogolical features but also reveal to a certain degree geological differences in rock-types, etc. Viewed geographically, northern and central parts of Gujarat are comparatively dry and hot. The former is also sandy while the latter has become a fertile country on account of the vast amount of alluvium brought and deposited in the adjoining areas by the great rivers like the Mahi, the Narbada and the Tapti. The peninsula of Kathiawar shows more of hilly ground while the land of Cutch—a sandy desert—presents extremes of climate and thus possesses no special character in common with the mainland of Gujarat. The highland region in the north-east is rocky and barren and shows a marked contrast from the south-eastern district which is thickly forested.

The one continuous stretch of land in the extreme north of Gujarat, formed out of the Ranns of Cutch, Radhanpur and Thar, is sandy and brackish in character and shows extreme type of climate with practically very little or no rainfall. The Central Gujarat (comprising the whole of the Kaira district together with the territory of Cambay and certain portions of the Mahikantha and Rewakantha agencies) with but few exceptions presents an uniformly flat and extremely fertile country. The rainfall (Map II) is about 30″ to 40″ and the area is very densely populated. Southern Gujarat comprising chiefly the district of Baroda, Panch Mahal and Surat is a very fertile tract formed out of the alluvium of the Mahi, the Narbada and the Tapti and the other small rivers. Along the extreme coastal margin the soil is rather sandy and brackish. The climate is comparatively moist with an average annual rainfall of about 60″ to 80″. The land is dissected by many small rivers like Purna, Ambika, Auranga, Par, Kolak and Damanganga.

(*b*) *Water System:*

Rivers.

Rivers of Gujarat, on the whole, belong to two main classes. The great west-flowing rivers from the continent of India with lengths varying from 70 to 750 miles drain an area of from 700 to 32,000 sq. miles, while the smaller streams about 85 miles long and with a drainage area of 2,380 sq. miles flow east from the peninsula of Kathiawar. The peninsula of India has witnessed comparatively very few geological changes after the close of the Mesozoic era. Gujarat, part and parcel of the peninsula, also shows little changes in the geography and topography of its crust. It is, therefore, believed that the peninsular rivers are all very ancient rivers which have reached their base-level-of-erosion and in some cases they are known to be aggrading their beds. Their channels have become broad and shallow which also point to the great antiquity of these rivers.

Between the Saraswati in the north and the Damanganga in the south, various other small and big rivers drain the mainland of Gujarat. These are the Banas, the Sabarmati, the Mahi, the Narbada, the Kim, the Tapti and the Ambika. Some of the rivers in southern Gujarat like Damanganga, Kolak, Par, Auranga, Ambika, Purna and Mindhola, though short and scanty of volume, are valuable, supplying, by their deep navigable tidal estuaries, an outlet for the produce of the district. They are also useful as affording good weather ports for the small crafts engaged in the coasting trade.

The Damanganga flows for about 15 miles towards north-west, entering the Arabian sea four miles south of the Kolak. The Ambika river, after a winding course of about 40 miles towards the south-west falls into the Arabian Sea 15 miles south of the Purna. The stream rises in the Bansda Hills and flows westward in two widely separated channels. In its western part the river is joined by two considerable streams, the Kaveri and Kharera. Below this junction the bed of the river widens out into a broad estuary stretching westwards to the sea.

The river Tapti, second only in magnitude to the Narbada, follows the same path as the latter with its source in the Satpuras (Mahadeo Hills) near Beytool and its

mouth in the Gulf of Cambay near Surat. The river runs for a long distance of 450 miles and drains about 30,000 sq. miles of land. The only important tributary received by the Tapti is the Wareli. The Kim river, with a course of 70 miles in length falls into the Gulf of Cambay about ten miles south of the estuary of the Narbada. Its source is in the Rajpipla Hills.

From the source to the mouth the river Narbada is about 800 miles in length and on the whole drains an area of about 36,000 sq. miles. It has its source in the mountain ranges of the Vindhyas at Amarkantak about 3,500 feet above sea-level. It flows between the Vindhyas on the one hand and the Satpuras on the other, whence it enters the plains of Gujarat and finally escapes into the Gulf of Cambay near Broach. In its course through the district of Broach, the Narbada receives three tributaries. Of the two that join from the left, the Kaveri flowing from the Rajpipla Hills, enters the Narbada near Sukaltirth, and further down about six miles above Broach, the Umravati stream forms the boundary between the Rajpipla territory and the Ankleshwar sub-division of the Broach district. On the right, the Bhukhi falls into the Narbada near the village of Mehgam, fifteen miles west of Broach.

The river Mahi, also known as Mahisagar, has its source in the highlands of Malwa, some 1,850 feet above sea-level. It is the third largest river in Gujarat travelling through a long distance of about 500 miles and drains an area of about 17,000 sq. miles.

The river Sabarmati, with its source in the lake Dhabar in the Aravalli ranges, finds its way through Mahikantha and discharges its waters into the Gulf of Cambay. Its length is about 200 miles. In the upper part of its course its banks are very precipitous, in some places rising to the height of 200 feet. But they gradually lower down to from 30 to 50 feet opposite the city of Ahmedabad and still lower as they near the sea. The river is for the most part shallow and sluggish, holding a winding and often changing course through a broad bed of sand. A noteworthy feature of the river is the formation by its frequently varying current of tracts of mud deposit, bhátha. At several points between Ahmedabad and the sea, the line of what was once its bed may still be traced a long way distant from its present course, and numerous abandoned village sites bear witness to the former inundations on the adjacent country.

The present Saraswati river rises in the Arasoor hills, enters the sandy region and finally disappears in the Rann of Cutch. About the lost river of the Indian desert—the Saraswati, which the traditions of the Hindus described as chief and purest of rivers, it is the opinion of the geologists that the present Saraswati cannot in any way be the old, lost Saraswati. On the other hand, it is very likely that the old Saraswati changed its course and turned eastwards to join the Ganges and later on may have assumed the name Jamna for its new course. " If this explanation be correct " writes Oldham, " the Hindu legend that the Saraswati joins the Ganges at Prayag or Allahabad, is unwittingly a true statement of fact."

The surface features of Kathiawar reveal two distinct belts of hilly country crossing the breadth of the province. These, together with a narrow stretch of table-

land in the centre, constitute distinct water-partings and from them flow all the rivers and streams by which the peninsula is drained. On the whole, the drainage of Kathiawar is radial. The currents, at first, are swift and clear, passing between steep banks and winding sluggishly through the lowlying lands they enter the sea. On the north and north-west they flow from the hills to the Rann and the Gulf of Cutch ; on the east to the Rann and Gulf of Cambay ; while on the south and south-west they carry their load from the Greater and Lesser Gir into the Arabian Sea. The two largest rivers of the province, the Bhadar and the Shatrunji take their rise in the opposite slopes of the hills and flow inwards towards each other, till they turn in opposite directions, the Bhadar westward to the Arabian Sea and the Shatrunji eastward to the Gulf of Cambay.

Creeks.

The salt water creeks that can be counted as important are the Hansthal, Bhavnagar, Sunarai, Bávliáli and Dholera creeks.

The Hansthal creek is a deep channel and connects the outer and inner Gulf of Cutch. It flows from the head of the Gulf of Cutch for above two miles in an easterly direction and then bends north-east. At five miles from its mouth it divides into two channels, one leading northwards towards Cutch and called the Cutch Khádi, the other leading south-east towards the shores of Malar and called the Málái Khádi.

The Bhavnagar creek which forms the channel between the town of that name and the Gulf of Cambay is a safe but winding passage navigable by large native craft for about five miles or within a mile of the town.

The Dholera creek is the channel leading to the important trading town of Dholera which is situated about ten miles inland. The channel is winding and the passage greatly depends on the state of the tide.

The Sunarai Khadi is about eight miles north of Bhavnagar. It is said to contain a fine broad channel of various depths for about 4½ miles inland, with a good muddy bottom. The channel does not dry like the Dholera creek.

The Bavhali creek is about two miles north of the Sunarai creek. It is said to be about 8 miles long and for the first five miles to vary in breadth from 550 to 600 feet.

Lakes.

Amongst the very few lakes of Gujarat may be mentioned the Sambhar lake of Rajputana, and the lake Nal of Kathiawar. During the rainy season the Sambhar lake attains a maximum depth of about 4 feet with an area of about 90 sq. miles. In the remaining part of the year, the lake gets dried up leaving behind salt encrustations in the bottom. To explain the occurrence of such deposits of salt in this lake bottom various arguments have been advanced. It is believed that at one time Sambhar lake was connected with the Gulf of Cambay. Another cause of the salinity is ascribed to the brine-springs. It is also supposed by some writers that the salt is brought in solution from the surrounding country. While according to Sir Holland and Dr. Christie this

deposit is the result of the wind-blown salt from the sea-coasts and partly also from the desiccated surface of the Rann of Cutch.

The lake Nal covers an area of 49 sq. miles, most of it under water all the year round. It is situated 37 miles south-west of Ahmedabad. It is a large shallow, brackish-water lake some twenty miles long and 2 or 3 miles broad, and seldom more than six feet deep and in most parts muddy lagoon. Also, it sometimes runs dry after a year of scanty rainfall. Although it is a land-locked remnant of the Bay of Cutch, the Nal lake is being gradually freshened. It represents what was once a continuous gulf connecting Bay of Cutch and Gulf of Cambay and separating Kathiawar and Cutch from the mainland of Gujarat (Fig. I). The bay is silting up and is now being often used as dry passage way in fair weather.

(*c*) *Mountain systems*:—

The highland region of Gujarat occupies chiefly the marginal zone in the east where are seen situated the ranges of hills and mountains like the Aravallis, Abu, Arasoor, Pavagarh and the highlands of Mahikantha and Rewakantha. To these may be added the Satpuras and the Sahyadris, fringing the eastern border of Gujarat. Of all these, it has been recognised, the Aravallis are the only instance of a true tectonic mountain chain ; whilst all the others are merely mountains of circumdenudation. The Aravallis are also considered as the oldest chain of mountains, the formations found in them belonging to the Dharwar rocks of great antiquity. They extended, in the old Palaezoic and Mesozoic period, from the Deccan to the mountain ranges beyond the northern limit of India, and had become the abode of glaciers in those days as the Himalayas are today.

The Satpura (meaning seven-folds) ranges so named from the seven parallel ridges of this mountain, are chiefly constituted of the most ancient granitoid and other metamorphic rocks which are unconformably overlain by sandstones of Mesozoic era. These in turn are capped by the horizontally bedded Deccan Trap lavas of Cretaceous age. Their easternmost extremity is in the Rewah State from where they proceed westwards along the southern skirts of the Narbada and terminate in the west in the Rajpipla Hills.

The Sahyadris or better known as the Western Ghats have touched the southern limits of Gujarat from where they extend southwards as a wall like structure along the marginal belt of the west coast of India. They are the relict type of mountains—a remnant of the Deccan Trap basaltic lava flows—which have survived the denudation of ages.

Abu (5600 ft.) and Arasoor occupy the north and northeast corners of Gujarat respectively ; while in the east is seen standing the hill of Pavagadh (2500 ft.) occupying an area of about 26 sq. miles.

Kathiawar is comparatively more hilly. The hill ranges in the north have a S.W.-N.E. trend with a total length of about 150 miles. Amongst these Bardo and Chotila are the two principal hills of which the former attains a height of about 2,050 feet while the latter is 1,170 feet above sea-level. In the south of Kathiawar the hill ranges are found running for about 100 miles in an east-west direction. Of these the

Gir mountain about 40 miles in length and 20 miles in breadth is thickly forested and is inhabited by lions and other wild animals. On the eastern slopes lies the hill of Shetrunjo. About ten miles from Junagadh is situated the well-known mountain of Girnar about 3,660 feet in height. Breadthwise it is hardly four miles, though in length it is about 15 miles.

(d) Coast line :

The coast of Gujarat like the coast of India is comparatively regular without many indentations. The number of creeks is fairly good but they have been silted up and have become useless for navigation. Dholera, Cambay, Broach and Surat once the well-known ports of Gujarat have now lost their importance and utility for the simple reason that the mouths of their respective rivers are being silted up every year. The coastal tract of Cutch and Kathiawar is rocky whilst the coast of Gujarat proper is shallow and hence there is always the difficulty for the approaching vessels. Between Daman and the mouth of the Tapti the land near the sea is low and in places particularly near rivers flooded during high tides in the rainy season. The coast north of the Tapti has a few sand-hills called the Suvali hills. Further northwards, to the banks of the Narbada the coast is low and marshy, cut by numerous creeks and overflowed at spring tides from one to four miles inland. From Broach bar to Jambusar or Tankharia road a flat, dry at low water, stretches for about two miles from the shore.

About half-way from Cambay towards the Rann of Cutch is a remarkable depression called the Nal, which lies about 30 miles to the south-west of Ahmedabad.

The coast of Kathiawar extending for about 70 miles from Amli in the north-east to Gopnath is partly a low muddy foreshore and partly sandy and rocky. It is seamed by many creeks and overflowed at high tides for a considerable distance inland. From Gopnath point the gulf runs northward tapering gradually till it reaches the Sabarmati on the north and the Mahi in the north-east. The total length of the gulf is about 80 miles while its maximum breadth at the mouth is about 30 miles. The eighty miles from Gopnath to Diu head present a succession of cliffs of moderate height. From Diu to Okhamandal some 160 miles, the coast is generally flat and fringed with a line of wind-blown sand hills. From here it extends to the head of the Gulf of Cutch for about 120 miles studded with low reefs and muddy foreshore. The coastline is broken at intervals by the mouths of rivers and creeks through which the sea gains access to a chain of salt wastes.

The Gulf of Cutch is a large bay of the Arabian Sea lying between the coasts of Cutch on the north and that of Kathiawar on the south. Its head is bounded by a portion of the land called the Rann. The gulf is about 25 miles across at the mouth and about 8 miles at the head. It enters the Little Rann by three large creeks, Nakti, in the north Kudlo in the north-east and Hansthal in the east.

(e) Slow secular changes :

Geologically speaking though the land of Gujarat has remained immune from any disastrous catastrophe, in the historical past and geological present, changes worthy of human record have occurred from time to time. These changes have, in

a way, been responsible for the changing topography of Gujarat. The Rann of Cutch, the changing course of the Indus, the encroachment and recession of the sea and the changing coastline are amongst the few notable events that deserve our attention.

The relative positions of sea and land are undergoing changes by quiet and hardly perceptible movements. In some regions the land is gradually rising, in other places it is slowly sinking. Such secular changes as they are called, causing recession and encroachment of the sea are also at work in the land of Gujarat. Proofs of elevation along the coast of Kathiawar and in some parts of Sind, are supplied by deposits of sand, gravel and oyster-shells, now standing above the reach of the highest tides. The miliolite limestones and other coral rocks in Kathiawar occurring at a great height prove that the land in Kathiawar has risen above sea-level since the formation of the above rocks which were formed evidently under sea-water. The encroachment of the sea on the coastal tract is very clearly seen even today at Bhimpore-Dumas sea-margin near Surat. The dilapidated structure of an old band-stand (evidently built on land) is now under sea-waters. Also, this Bhimpore-Dumas shore is marked by a large number of erect tree-stumps still rooted in the shore-ground and washed by waters at high tides. That the land on the east coast of the island of Bombay is undergoing slow subsidence is inferred from a number of tree-stumps with their roots *in situ*, 12 feet below low-water mark and 30 feet below high-water. As a result of the great earthquake of 1819 an area covering about 2,000 sq. miles in Cutch underwent subsidence. (Fig. I.)

Proofs of encroachment of either the land or of the sea are also not wanting. That the present peninsula of Kathiawar was once, in the recent geological past, an island is proved from the presence of a belt of salt land between Kathiawar and the mainland of Gujarat. This shows that at one time a channel joined the Rann with the Gulf of Cambay, and that the whole northern margin of Kathiawar was once washed by the sea. This shallow sea-bed was gradually filled up by the detritus brought by the rivers like the Luni, the Banas, the Saraswati, the Rupen, the Sabarmati and the old eastern branch of the Indus and the north-east strip of Kathiawar was joined to the mainland. It has also been recorded that at Jafarabad, within ten or twelve years, the sea had receded about fifteen feet. At Veraval also the sea had receded considerably. At Gogha in eastern Kathiawar the encroachment of the sea had been considerable. Also, a large area of land on the Bhavnagar coast had been covered by the sea during a few years. That there is also an encroachment of land round the head of the gulf of Cambay is inferred from the Morai Mata spot near the Dholera creek. It has been observed that this spot just north of the town and about seven miles west from the nearest point of the present coastline, was a place of anchorage in the sixteenth century.

(*f*) *Earthquakes :*

Amongst the many earthquakes of great magnitude that have shaken the Peninsula so often during historic times, the Cutch earthquake of 1819 ranks as one of the foremost in magnitude. It had caused great damage to life and property. Anjar suffered heavily while the village of Jodiya met with complete destruction. The great mosque of Sultan Ahmad in Ahmedabad was destroyed after standing for 450

years. The Sindree brick fort of a 150 feet square was overwhelmed by the ocean waters which spread on all sides of Sindri for about 16 miles. About five miles northwards from Sindri the land was found to be comparatively raised up and turned into a mound of earth and sand. It was stretching east-west for 16 miles. This raised up land was designated by the people the " Allah Bund."

Of late, Gujarat has experienced once again minor earthquake shocks. In 1938 shocks were felt at Paliyad in Kathiawar ; and they continued to be felt for some days together. Little damage was done to the property. (Fig. I.)

But for these exceptions the land of Gujarat may, for geological reasons, be considered immune to earthquake shocks as it lies far outside the oft-affected earthquake belt of the northern mountainous district of India.

Section II

Geological Features

Just as the studies in the sciences of anthropology or sociology or politics become helpful in our understanding of the human species, similarly the science of geology may be used with advantage in the delineation of the nature of the various activities of man, past and present. Geology becomes a valuable instrument of study in this respect when we know that the physical environment exerts a great influence upon human culture and human activities. In his right and proper understanding, therefore, of the man's past and present, the historian cannot afford to neglect the geological and geographical factors ; for they largely help to reveal the nature of the social environment. Men live in groups, and every group is attached to some place or region. Every such region presents a certain type of topography, a certain type of soil, certain mineral and metal resources, and a certain type of climate. All these factors constitute the physical environment of the group. To this environment the social group must adjust itself. It will be realised, therefore, that the influence of environment upon the history of man and upon the shaping of human culture should have been tremendous.

Geologically speaking, man is a late comer to the earth, but he began to be influenced by the geological and geographical processes from very early times. The distribution of relief, rocks and minerals, the positions of mountains and plains, of swamps and of passes have played a dominant part in his development and progress. To be more exact, during the old Stone-Age man was influenced by the geological features of his surroundings in his search for shelter. It was more so during the Ice-Age when he was led to inhabit caves. In his migrations too, he followed the belts of dry upland country, avoiding the clay tracts which were often marshy or which, after the Ice-Age, became heavily wooded. Thus, ancient man became attracted to such regions where natural shelters were provided for him. Man, thus, has all along been a creature of environment. As a prelude to the history of Maha Gujarat, therefore, it will be in the fitness of things to examine the various geological and geographical changes that have been impressed upon the face of Gujarat during the course of its long geological past.

(*a*) *Archaean system—formative period of crustal evolution :*

Just as the history of a country is divided up into named periods, so geological history comprises a succession of conveniently defined Periods, while the rocks which were formed during any one period constitute a geological system. The geological history (Map III) of Maha Gujarat may be said to commence with a group of metamorphic rocks formed some 1,800 m.y. back and today seen exposed in the Aravallis and in the north-eastern parts of Gujarat. These rocks are universal, that is, they are not absent from any locality and form the foundation upon which the younger rocks rest everywhere. This is also regarded as the primeval crust of our planet as it first cooled and condensed from a gaseous or liquid mass. At this early period of the earth's beginning oceans were not yet born, and all the land areas of the globe were probably united together into one world continent. As in other parts of the globe, these early rocks in Gujarat suffer from one serious disability—absence of fossils which render them quite unsuitable for unravelling and understanding of the geological past. The rocks of this age are represented chiefly by granites and gneisses and are grouped together by geologists under the name of the Archæan System.

(*b*) *Dharwar system and the rise of Aravallis :*

After this formative era of crustal evolution the conditions were obtained all over the globe whereby primeval ocean basins came into existence. The supercharged atmosphere with its water-vapour (for it is believed that the atmosphere and the whole world in fact was materially different from the world of today) slowly condensed and filled up the ocean basins with water. Since that time, the exposed portions of the crust have been subjected to wastage, to wear and tear, and to disintegration caused by temperature changes, running water, etc. About this time, *i.e.*, about 1,000 m.y. back the land of Gujarat also became occupied by the primeval ocean, and the products of wastage spread out on this ocean basin as sheets of sediment deposited one upon another as time progressed. These rocks constitute the sedimentary skin over the Archæans and have passed under the name of the Dharwars in Indian Geology. With the passage of time the Dharwar rocks underwent a series of transformations and acquired characters very different from their original types. Remnants of these highly altered and metamorphosed sediments are observed in the north of the Baroda territory at Champaner and in the Rewakantha States. They extend further northwards as far as Kishengarh in Rajputana and the Aravallis. They re-appear once again in the Abu massif and extend westwards as far as Nagarparkar to the north of the Rann of Cutch. The area round about Palitana and Ghogha and the portions of the southern Rajputana States of Partabgarh, Dungarpur and Banswara are composed of this metamorphic series of rocks. The main rock-types notable in this series are slates, quartzites and marbles with intrusive granites. The formations of this group also show no semblance of life, either plant or animal, for, it is believed that life had not yet dawned in any part of the globe. But they are admittedly of immense economic value on account of the precious metals which are sealed up within them. The rocks of this age in Gujarat have, however, failed to reveal any such deposits of economic value. At the best we can make mention of the manganese deposits (Shivrajpur mines) in the Panch Mahals. Well known Motipura marbles also belong to this series of rock-formations.

With the constant pouring in of the deposits the Archæan sea was gradually becoming shallower till at last, after a gap of about 250 m. years (*i.e.*, the close of the Vindhyan era), the sea-waters completely disappeared from this area. Gujarat became a land-mass, certainly with a topography and a configuration totally different from those of our own. At this period the Dharwar and other later sediments were involved in gigantic earth-movements of the mountain-building type. This was a momentous period in the geological evolution of Gujarat. For, as a result of this intense play of orogenic forces the Aravallis came into existence. They rose into a lofty mountain-system (much more than what we see today) and extended as a continuous chain from the Deccan to beyond the northern limits of India. From this date on to the present day, the area of Gujarat remained a land-mass except for local minor marine incursions as we shall presently see.

By this time the global surface conditions appear to have changed for in the Pre-Cambrian sedimentary rocks of Cuddapah and Vindhyan ages we find traces of some microscopic forms of lowly evolved life. But to geologists this phenomena seem inexplicable when it is remembered that the earth had grown through a long geological period of about a thousand (1000 m. y.) million years. To say that life had not yet evolved to perfect organised form is also equally strange for in the next immediately overlying Cambrian rocks the first highly evolved fauna—a definite assemblage of living creatures in fossil form make their appearance. In this Cambrian fauna nearly all the main branches of the invertebrate animal kingdom from jelly-fish to crustaceans are there. But there is not a single back-boned creature (vertebrate) among them, neither are there any land plants. From this group of varied life have been evolved the multitudes of creatures which inhabit our planet today.

(c) *Gondwana system—repository of coal :*

The glimpses of the geological evolution of Gujarat during this long span of about 600 million years (*i.e.*, from Cuddapah to Carboniferous) are lost to us, for no sedimentation occurred in Gujarat and consequently no trace of life was preserved. The succeeding marine group of the Palæozoic Era, is, therefore, entirely unrepresented in Gujarat and for that reason it becomes very difficult to draw any physiographical sketch of the land province of this palœozoic. However, the subsequent records of the Gondwana deposits occurring in Cutch and in some parts of northern Gujarat throw light on the new cycle of events that had come to pass in Gujarat at about the close of the Carboniferous system which happened about 200 million years ago. Gujarat, at this distant date, had no separate existence of its own ; it was a part and parcel of the great Gondwana continent (the southern hemisphere) which extended from Australia through Peninsular India and Africa on to South America (Fig. III). The evolution in the march of life had made a considerable progress as it is evident in various other parts of the world. The animal world had undergone a remarkable transformation. Such ancient types as trilobites, blastoids and cystideans had now wholly vanished. The brachiopod life also rapidly diminished in number and variety. Vertebrate life (fishes) had already made its appearance. The Gondwana land became also infested with varied types of vegetable growth of plants like Sigillaria, Stigmaria, Lepidodendron, Calamites, Cycads and Conifers.

The fossil remains of this luxuriant vegetation locked up in these Gondwana sediments have become a veritable store-house and source of the coal-wealth of India.

At the end of the Palaezoic Era, *i.e.*, at about the close of the Carboniferous period the Peninsular land-mass of the Gondwana continent was dissected by the sinking of large earth blocks producing trough shaped depressions. These depressions or hollows were subsequently filled up with the sediments brought into them by the neighbouring river-system. These rocks (sandstones, shales and conglomerates) which have come to be regarded as the Gondwana deposits in Indian Geology have preserved in them the coal deposits of India.

In Gujarat the Gondwana system is represented by a group of rock formations occurring in a small village of Umia in western Cutch. The Umia series is more than 3,000 feet thick. The Gondwana rocks have also been found in Dhrangadhra and Wadhwan. They are horizontally bedded sand-stones and occupy an area of about 1,000 square miles. They are older than the Umia beds of Cutch and are found to be of Upper Jurassic or Lower Cretaceous age. The yellow sand-stones of this series are intercalated with thin coal seams in its lower part. They have attained an aggregate thickness of 1,000 feet, the lower half being of the Jabbalpur age and the upper half of the Umia age. But for the stray occurrence of coal here and there, the Gondwanas of Gujarat are observed to contain no workable coal seams to be of any economic value.

(*d*) *Jurassic system—period of marine transgression:*

The Gondwana conditions prevailed till about the end of the Jurassic period. Then there ushered in a period of marine transgression during which the sea-waters encroached upon certain regions of the Indian Gondwana land (Fig. II). It was about this time, *i.e.*, during the Jurassic period that the northern part of Gujarat appears to have been invaded by an arm of the great northern sea—the Tethys (which divided the globe into the northern and southern hemispheres) and portions of Cutch and Rajputana once again were submerged under sea-waters. Marine conditions once again prevailed and thus commenced an era of marine deposition in Gujarat.

The best exposures of these marine transgression deposits have been studied in Cutch where they are found to be over 6,000 feet thick. The rocks of this system are observed to crop out in three anticlinal ridges trending east-west. Towards the east these rocks appear in Dhrangadhra in Kathiawar and farther north in the villages of Patcham, Chari, Katrol and Umia in the Rann of Cutch. They seem to extend further north in Rajputana. Thus it appears that they form parts of a large basin, a shallow sea which extended northwards from Kathiawar, as far as the Salt Range in the Punjab.

The Jurassics of Cutch include four series—Patcham, Chari, Katrol and Umia in ascending order, consisting chiefly of sandstones, shales and limestones. The fossil wealth is also abundant and includes a large assemblage of fossil sea-animals of the class of cephalopoda (ammonities).

(e) Cretaceous system and the incursion of the Tethys :

The Jurassic conditions in Gujarat seem to have ended with the Umia deposits of Cutch. The geological history of this period is hardly 125 m. y. old. Gujarat was still connected with or was a part of the main Gondwana continent, and passed through the same vicissitudes of geological changes as the main Gondwana land. There was another incursion of the sea from the north. It overspread Baluchistan and an arm of the same sea (the Tethys) extended further south and penetrated eastward along the present Narbada valley (Fig. II). These marine transgression deposits together with some of the deposits of fluviatile origin of the Narbada valley constitute a group of rocks called the Cretaceous rocks of Gujarat.

These rocks are classified under four different heads according to their origin and distinctive lithological characters: (1) the Ahmednagar sandstone; (2) the Lameta beds; (3) the Bagh beds; and (4) the Nimar sandstone. The Ahmednagar sandstones are a thick, horizontally bedded series of deposits and consist of sandstones, shales and conglomerates of various shades of pink, red and brown. These rocks have been assigned a Lower Cretaceous age on the evidence of plant fossils. It is believed that the Dhrangadhra sandstones of Upper Gondwanas, the Songir sandstone of Baroda, the Barmer sandstone of Western Rajputana and the Ahmednagar sandstone are all very similar and are, most probably, of the same age.

The Lameta series of rocks (from the Lameta Ghat near Jubbalpore) are of estuarine origin. In comparison to its wide distribution the series is limited in vertical extent and consists mainly of siliceous limestones together with sandstones and clays. The outcrops of these rocks have been observed at several places in Gujarat as the Kushalgarh-Banswara frontier, the Sunth State frontier adjoining the Jhalod Taluka of the Panch Mahals district, the Dohad taluka, the Balasinor State, the Lunavada State and the Gabat State.

The Bagh beds are marine deposits laid down in an arm of the Tethys which overspread this part of India during the Cretaceous period. Good exposures are seen in the type area near Bagh in Gwalior State, whence they extend westwards as far as Wadhwan in Kathiawar. Extremely good outcrops of these rocks have been traced in the Panch Mahals in Gujarat; while their disconnected outcrops occur along the margin of the Deccan Trap in Vajiria, Agar, Naswadi, Boriad and Chhota Udepur States of the Rewakantha Agency. The chief rock-types include conglomerates, sandstones, shales and limestones. They rest with a break on the ancient metamorphic rocks and in places on the middle Gondwana rocks. The maximum thickness attained by these rocks was, it is presumed, over a thousand feet in Rajpipla State. The bulk of the fossils found in them are marine pointing to the prevalence of marine conditions in the area.

The Nimar sandstone is a type of gritty sandstone lying to the south-east of Pavagarh Hill. It is found to overlie unconformably the Aravalli schists and phyllites and correspond in age with the basement layers of the Bagh beds.

(*f*) *The Deccan Trap—episode of volcanic activity :*

Following close the end of the Cretaceous period the Gondwanaland was affected by a major tectonic disturbance. The old southern continent (Gondwana continent) was breaking up ; though India had not yet separated from Africa. The northern sea (the Tethys) overflowed the land in the region of the lower Narbada. Both the sea and land teemed with life which showed considerable progress in the stage of evolution. Age of amphibians had passed and its place was taken by reptiles. Man and mammals had not yet appeared on the scene. Amongst the denizens of the land, dinosaurs lived and flourished in the forests of the Central Provinces, the last remains of which lie buried in the Lameta beds near Jabbalpore. The preponderance of palm flora pervading the land areas of this period is revealed by the discovery of fossils of the type *Palmocarpon* and *Nipadites*. The present configuration of the Indian continent was in the process of making ; for we know that the Indian land-mass was drifting north-eastwards from its former position in the southern hemisphere (Fig. III). The Asiatic block of the northern hemisphere (Angara land) was moving south-west towards India. As these two great land-masses approached each other, the sedimentary layers of deposits which had collected on the bed of the Tethys (the northern sea which encircled the globe separating the northern and southern hemispheres) through long aeons of time were being slowly ridged up to form the Himalayan chain.

It was over such a scene as this that the volcanic activity manifested itself on the land of Gujarat and in fact over a large portion of the Gondwana continent. The tremendous discharge of volcanic material (lava and ashes) may be considered to be in the wake of the great catastrophic changes that visited the Gondwana land at the close of the Cretaceous period causing fissures and rifts in the crust. From these fissures or cracks floods of lava welled out burying beneath them the then existing topography. A new type of landscape developed with high volcanic plateaus (the remnants of which we see today in the plateaus of Mahableshwar and Matheran) as a dominant feature. The volcanic lavas and dust probably converted the whole of Gujarat into one stretch of dry, treeless, desert land, out of the disintegration and decomposition of which is born the present black, fertile land —the granary of Gujarat.

The Deccan Trap formation (as these lava sheets are called) is the most extensive formation in the province of Maha Gujarat. The lava flows occur as horizontally bedded sheets and have carved a peculiar scenery of flat-topped hills and step-like terraces. They extend all along the eastern border of Gujarat with several detached outliers as in the hills of Girnar and Pawagadh and the Satpura and the Sahyadri ranges. Very extensive areas in Cutch and Kathiawar are also seen covered with these lava flows. Old fissures (forming dykes or walls) which are considered to be the feeders for the lava flows can still be recognised in the Rajpipla hills, Cutch and Kathiawar. The rocks are dominantly basic in character and weather into rounded boulders and gravels and yield, on complete weathering and decomposition, highly fertile black soil (*regur*). This whole sequence of volcanic

outburst from beginning to end, with intervening period of repose, dates as far back as 80 to 90 million years.

(g) *Tertiary era—period of evolution of the land of Gujarat, the rise of the Himalayas and the appearance of man:*

It is the belief of some geologists that the Tertiary era had dawned to the accompaniment of volcanic outbursts. It was the birth of a new era in a very real sense, and was heralded by geological events of great magnitude. The western coast of India which was still connected with Madagaskar by the Lemurian land-bridge now completely foundered beneath the ocean. By the sinking of this tract the gulf between India and Africa widened out into the Arabian Sea, isolating the triangular peninsula of the Indian continent (Fig. IV), and the land of Gujarat also acquired the same physiographical features that are revealed in its outline today. The great Mediterranean or the Tethys sea also began to be interrupted by the gradual rising of the great Alpine-Himalayan mountain system.

Another very important and striking event of this date was the marked change in the character of the fauna and flora of the Mesozoic era. The face of the earth was rapidly changing. She put on a more modern garb of vegetation ; the land, lakes and rivers became peopled by creatures more familiar to us. Still there is no sign of man. But the stage is being set for his arrival. This period (Eocene) foreshadowed the birth, out of the sea, of the mightiest mountains of the world, the Himalayas.

During the period, these great physiographic and crustal changes were impressed upon the Indian continent, parts of the province of Gujarat still continued to be under the influence of the sea. It had not yet emerged as a complete land-mass which we know from the occurrence of marine Tertiary deposits found in Cutch, Kathiawar, Gujarat and Rajputana. The Eocene rocks of Gujarat are exposed in the low-lying tract between Surat and Broach in two different outcrops separated by the alluvium of the Kim river. They rest uncomformably on the underlying lavas and include such rocks as nummulitic limestones, gravel beds, sandstones, conglomerates and shales. The conglomerates contain pebbles of agate and other forms of silica derived from the denudation of the underlying traps. These pebbles are extracted and worked as semi-precious stones.

The Eocenes of Cutch occur as two long bands parallel with the coast. They consist of gypseous and carbonaceous shales and sandy limestones. They are overlain by limestones of Oligocene and Lower Miocene age. In the western part of Kathiawar occur fossiliferous beds and sandy foraminiferal limestones of this age which are named as Dwarka beds. Near Bhavnagar and Perim have outcropped sandstones of Siwalik (Miocene) age. The deposits of the latter area have yielded Tertiary mammalian fossils of goats, pigs, rhinoceros, giraffes and mastodon.

The Pleistocene period *i.e.*, the opening of the Quarternary Era, shows abundant and distinct signs of glaciation in the northern hemisphere of the globe. In India also, such evidences, though very meagre, do exist and point to the general lowering of temperature. The system is also remarkable for the preservation of

evidences of the advent of man on the surface of the earth. According to De Terra the Boulder Conglomerate stage of the Siwaliks (Chello-Acheulian of Europe) marks the period when man had already appeared in Kashmir. The Narbada river alluvium and the Sabarmati alluvium in Gujarat have been noted as the repositories of human implements which include axes and flakes and scrapers. In point of age they are Lower Pleistocene deposits which are computed to be hardly two million years old.

The Pleistocene period shaded without abrupt change of any kind into what is termed the Human or Recent period, for it is chiefly distinguished by the presence and influence of man. Amongst the important geological events of this date may be mentioned the formation of black cotton and other soils, river-terraces of the rivers, wind-blown deposits of loess bordering Mahi and Sabarmati, laterite caps and the raised beaches along the coasts of Kathiawar. While the silting up of the Cambay and Cutch gulfs, the conversion of Kathiawar island into a peninsula, the drying up of Saraswati and the earthquake disturbances that affected Cutch and parts of Gujarat (1819) are geological events that have been witnessed and chronicled as historical documents by man.

Section III

Economic Features

In this section have been included important localities of mineral deposits and rock-formations of economic value, semi-precious stones, natural gas deposits, salt deposits, hot water springs and the different types of soils occurring in the various districts of the province of Gujarat.

Gujarat hardly possesses any economic mineral deposits of sufficient importance either in quality or in quantity to attract the attention of the international market. At the best we can make mention of the manganese deposits (Shivrajpur mines) in the Panch Mahals which has become a good source in India's annual production of manganese.

The presence of ancient iron slags in some parts of Gujarat like Ahmedabad, Kaira, the Panch Mahals and Surat is an evidence of the local iron industries that might have thrived there in the past. But there is no indication to suggest that suitable ores of quality or quantity occur in Gujarat to maintain the needs of a modern blast furnace. Iron in those days, it appears, was extracted mainly from deposits of laterite rich in this element and was hardly sufficient for local demands of a small community.

Besides these two metallic minerals, Gujarat has become famous and has acquired recognition in the world market since days of yore for its agate industry. The many forms of silica—agate, carnelian, chalcedony, etc.—resulting from the weathering of the Traps in various parts of Gujarat, has catered well to the needs of Cambay agate workers from very ancient times. It is a well-known fact that onyx and carnelian cups and other ornamental articles manufactured in this part of India had found favour amongst the people of distant lands like Rome, Greece, Egypt and China since very early times.

Gujarat has also a number of hot-water springs distributed in different localities of the Province. In certain cases they have been found useful in the alleviation of certain diseases.

Rocks, with all their varied useful aspects, also find a place as an article of commodity. The past records of the 'Stone Age' speak volumes of the importance and utility of stones to humanity in its infancy. They also do no mean service to the modern man who uses it in the manufacture of cement, construction of buildings, roads, metal, architecture, etc. Gujarat with all its varied types of rocks claims no special privilege in the stone trade except the marbles of Motipura, the limestones of Kathiawar (Porbandar limestone) and the sandstones of Songir. Motipura marbles possess some architectural value while the sandstone of Songir is largely used as a millstone.

(a) Rocks used as building stones and for other purposes :

Amongst the various types of rocks of economic importance occurring in Gujarat the following few deserve mention : Marble, granite, sandstone, limestone, basalt (Deccan Trap).

Marble. In the Baroda State near Motipura and Harikna there are outcrops of green, pink, white and mottled limestone, well-known as 'Motipura marble' occurring as bands in gneiss. It makes a very beautiful marble. Pale brown and cream coloured varieties occur. White mottled hard marble occurs at Khirasra and Sajriala in Kathiawar. The stone is capable of a high polish but is found only in limited quantities. Marble varying in colour from black to greenish and white occur near Gora, Vanji, Mokhadi and Todakhail in the Rajpipla State. The black varieties take a good polish.

Granite. At Virpur in Baroda a pale pink and greyish pink granite has been observed, It is coarse and very tough and durable. Pale pink and green granite is found at Bhulvan on the Orsang river, Baroda State. The rock takes a high polish.

Sandstone. At Songir in Baroda occur sandstones of considerable variety as to colour and character of grain. It is an excellent freestone and has been quarried on an extensive scale. It is chiefly used as a millstone. Good varieties of sandstones are furnished by the lower Jurassic group of Cutch. The sandstone quarries of Ahmednagar yield an excellent freestone. Light coloured kaolinic sandstones of upper Jurassic age occur in the neighbourhood of Dhrangadra in Kathiawar where there are extensive quarries. The stone is much esteemed for building purposes. At Baoli in Kathiawar, a sandstone of fine texture is quarried and is used as a whetstone or for ornamental purposes, and also for making cups, pipe bowls, etc.

Limestone. Hard, compact limestones of various colours occur at Sandra on the Hesan river, Baroda State. It is a first class building stone. The limestones of the lower Jurassic group in Cutch furnish good black and grey, or orange stone. Black and grey varieties are obtained from the hill ranges north of Bhuj; and the orange type occurs at Raimalru

hill near Kaora. A finely oolitic and highly organic, porous limestone known as "miliolite" or more commonly as "Porbandar stone" from the name of the port whence it is shipped to Bombay and other places, is extensively quarried along the western base of the Barda hills in Kathiawar, especially in the neighbourhood of Ranpur. The stone is of a fine white or buff colour, very obliquely laminated and is easily worked. The refuse chips and rubble are burnt for lime which is said to be of excellent quality. Artificial stone is made from powdered Porbandar stone and sand from dunes on the coast of Cutch. It is described as having given good results. A dense shelly limestone occurring near Bardia in Kathiawar would be used in place of marble suitable for decorative purposes. It is of a pinkish yellow colour. A finely-textured, fossiliferous limestone known as *Pindaralite* occurs in the Gaj groud at Pindara. The stone is of a yellow or orange brown colour becoming red when sun-baked and is suitable for architectural work of every description. Nummulitic limestone occurs in great quantities around Tarkeshwar N. E. of Surat.

Trap rock.

Trap rock both of acid and basic character occurs in large quantities in various parts of Gujarat like Kathiawar, Rajpipla, etc. It is mostly used as road metal and also for building purposes.

(*b*) *Minerals of economic value including natural gas and salt :*

Semi-precious stones.

The chief sources of these stones are the amygdaloidal lava flows of the Deccan Trap. In certain places there are extensive Tertiary and sub-recent gravel and conglomerate beds made up almost entirely of agate and chalcedony. The bulk of these stones comes from Ratanpur and other places in the Rajpipla State. The parallel-banded chalcedony called onyx also occurs in Rajpipla. Veined agates come from Ranpur in Ahmedabad. They are found near the surface in pebbles of various shapes. A variety of agate much prized by the lapidaries of Cambay are found at Kapadvanj, Kaira in the bed of the Majam river. Some nodules are of the variety known as *landscape agate*. *Moss agates* come from the villages Latipur, Timbri, Otala and Veratia in Kathiawar. Green jasper with brilliant red streaks or spots commonly known as heliotrope or bloodstone is found near Tankara, Kathiawar. Rock crystal is also obtained from Tankara.

Gypsum.

Gypsum (hydrous calcium sulphate) is known as selenite when it occurs in a transparent, crystalline form. Its massive, fine-grained modification is alabaster while the commonest variety is the ordinary gypsum. Shales of Jurassic, Cretaceous and Tertiary ages in Cutch and Kathiawar are known to contain large quantities of gypsum. Gypsum obtained from near Adesar, Chitrore, Umarsar and Mhurr in Cutch is generally translucent and occurs in blocks several inches in length. In Kathiawar near Nandana and Kuranga and in Bhawnagar State it occurs in tabular masses and crystals. The quantity of gypsum in Gujarat is inconsiderable but is much more extensive in N. India. Gypsum is used as an important source of sulphur and sulphuric acid and its successful utilisation for this purpose awaits the co-operation of capital and technology.

China clay. Clays suited for the manufacture of high class pottery occur in the Tertiary beds exposed in the Jhagadia and Valia taluks, Rajpipla State. The best specimens are found to the west of Damlai. Kathiawar clays are utilised by the Than Pottery in the manufacture of white ware and porcelain. Deposits of china clay in Mahikantha and Sabarmatti Valley are utilised for the manufacture of refined clay used for variety of purposes in the textile industry.

Ochre. Ochreous lithomarges or bole of various colours are employed, under the genetic name *geru*, for colouring the walls of houses, making caste marks, etc. Some of the highly ferruginous beds of the sub-nummulitic series, occurring near Lakhpat in Cutch are used as pigments. The white shales from the same series and the Jurassic formation are used as white wash. Deposits of yellow ochre occur to the south-west of Hariawar in Navanagar State, Kathiawar. Red and yellow ochre deposits are found in Jhagadia, Valia and Padvania of the Rajpipla State.

Iron. Although the ores of iron, especially those of lateritic origin, are distributed in many parts of Gujarat, practically no use is now made of them. In olden days the ore was derived either from beds of haematitic laterite in the sub-nummulitic group or from highly ferruginous deposits associated with stratified Trap near Buchao in Cutch. By 1872, the industry had become extinct. Almost about the same time as in Cutch iron was being smelted at Ranawao and Ranpur in Kathiawar. The ore was obtained from lateritic deposits near Bakharla and from ironstone bands near the top of the Umia (Jurassic) group. Lateritic deposits of iron ore occur at Sambelia Bet, Maha Devia, Tamba Talao, Khokhra Dhar and Bhatia in Kathiawar.

Manganese. Ores of manganese of considerable quantity occur at Sivarajpur in the Panch Mahals. The ores consist of psilomelane with some braunite and pyrolusite, formed mainly by replacement of limonite quartzites of the Champaner series. The deposits have been worked since 1905.

Coal. The occurrence of coal in the whole of the Province can be said to be negligible. The coal mainly found in Cutch and Kathiawar is of Jurassic age. Attempts were made to work the coal seams of Bhuj and Trombon in Cutch but without success. Black carbonaceous shale with thin seams of coal found near Than in Kathiawar has yielded coal which has no value as fuel.

Copper. Small quantities of copper ore are reported in the hills running south from Bhudli and near Navanagar in Kathiawar.

Gold. Gold in small quantity is obtained from the sands of the Sourekha river which rises in the Girnar hills.

Lead. Galena was found associated with copper pyrites in a quartz vein traversing Trap rock at Banej-Nes in the Gir hills. The ore is said to occur irregularly and in very small quantity.

Natural Gas.

Natural gas has been tapped at Jagatia and Gogha in Kathiawar and at Baroda and is believed to be derived from upper Tertiary strata which rest on a platform of Deccan Trap and thicken towards the Gulf of Cambay. The structure of the Tertiary belt of north-east Kathiawar, it is believed, may prove favourable for the presence of concealed gas fields.

Salt.

Nearly all the rocks in Cutch, especially the upper Jurassic and lower Tertiary beds, are strongly impregnated with chloride of sodium and other salts. There are salt factories at Dharasna and Chharavada on the east of the gulf of Cambay. The Okha Salt Works Ltd. manufacture fine white crusted salt at Mithapur near Okha in Kathiawar. Much of the salt comes from the brine of wells on the little Rann of Cutch, of which there are works at Kharagoda and Udu. Other sodium compounds called alkaline earths used by dhobis for laundering and by the poorer classes for the cleansing of cooking utensils and for domestic purposes generally are also available from certain places in Gujarat. Crude soap is still manufactured from alkaline incrustations gathered near the banks of the Bokh and Khari rivers near Prantij, Ahmedabad district.

(c) *Mineral-water Springs :*

The people of India have long recognised the value of springs in the alleviation of diseases. In some cases they are held sacred, where temples are erected and rest-houses with baths are built for the use of the pilgrims. There are many such springs in Gujarat, the list of which is given below.

There is a spring near Mhurr in Cutch. A strong spring of warm saline water supplies a reservoir about 330 sq. yds. in extent. Tulshi Sham spring is situated in the Gir hills in Kathiawar. The water of this spring is used for bathing, but has no medicinal properties. Total solids found are 11.87 (total solids are given in parts per 10,000). Nacl=7.92, Na_2So_4=1.13, $CaSo_4$=0.41, $CaCo_3$=1.33, SiO_2=1.08.

There is a spring at Harsol in Ahmedabad. The waters of this spring have a temperature of about 80°-90°F. The water has a peculiar taste, and is said to be very efficacious in certain diseases. Total solids present are 13.84. NaCl=8.45, $CaSo_4$=1.07, Na_2Co_3=1.52, $MgCo_3$=0.54, $CaCo_3$=1.98, SiO_2=0.28.

Kawa springs of Broach are well known. The waters are cold and the total solids present in them are 13.34. The water is considered to be a specific preventive of hydrophobia. NaCl=6.74, Na_2So_4=2.04, Na_2Co_3=1.94, $MgCo_3$=1.58, $CaCo_3$=0.57, SiO_2=0.47.

Three different groups of springs have been recorded at Lasundara in Kaira. The first group consists of seven springs with a temperature of about 100° to 122°F. In the second group there is only one spring with a temperature of 101°F. The third group is a cluster of nine springs and their waters possess a temperature of about 87° to 114°F. The hottest springs are strongly sulphurous and the water is saline. It is used in the diseases of the skin. Total solids present are 60.76. NaCl=42.35, $CaCl_2$=14.53, $CaSo_4$=3.88.

Numerous hot springs some with a temperature near boiling point have been located in Tuwa or Tui in the Panch Mahals. The waters emit a highly sulphurous smell. They are also found to be radioactive. Total solids present are 47.70. $NaCl=36.69$, $CaCl_2=7.19$, $CaSo_4=3.82$.

In Surat District Anavil or Devki Unai near Billimora is the place where several springs occur. They discharge more than two cubic feet of water per minute with a temperature of 115° to 120°F. The waters also emit sulphurous gas. Total solids are 12.79. $NaCl=8.46$, $CaSo_4=1.64$, $Na_2Co_3=1.86$, $CaCo_3=0.15$, $SiO_2=0.68$.

At Vajrabai near Bombay several springs have been observed to rise in the bed of the Tansa river. The temperature is 110° to 136°F. and in certain cases the discharge of water is very copious of about twelve gallons per minute. The waters emit sulphuretted hydrogen and are said to induce appetite. Total solids are 22.64. $NaCl=12.41$, $CaCl_2=7.07$, $CaSo_4=2.08$, $SiO_2=0.88$. Kokner is another place in Thana near Bombay where a group of hot springs has been found. The waters are as hot as can be borne by the hand. Total solids present are 80.45. $NaCl=27.78$, $MgCl_2=0.39$, $CaCl_2=50.03$, $CaSo_4=1.89$, $SiO_2=0.36$.

(*d*) *Soils :*

Soil is the uppermost weathered layer of the solid crust. Therefore well-marked rock-groups will give rise to certain definite types of soils which will vary in consistency, in depth and in composition according to the nature of the underlying rocks. They are further modified through climate, topography, organic agency, etc. but their fundamental characters more or less remain unchanged. From the geological standpoint, therefore, the soils of Gujarat (Map IV) may be broadly grouped under four different heads :

(*i*) Soils formed out of the oldest crystalline and metamorphic rocks (Archaean and Dharwar groups) ;

(*ii*) Soils formed out of the decomposition of the Deccan Traps ;

(*iii*) Soil caps of the Jurassic and Tertiary sedimentary rocks (sandy, shaly and calcareous) ;

(*iv*) Soils originating from the recent and sub-recent rocks : (*a*) river-alluvium and deltaic alluvium and (*b*) desert deposits.

Soils of group one are traced in the north-eastern tract of Gujarat lying north of Baroda. This area is chiefly constituted of the gneisses, schists and granites of Archaean and Dharwar age. The rocks have given rise to soils which pass under the name of 'red-soils.' The soils originating from these rocks are generally poor in nitrogen, phosphorous and humus and contain fair quantity of alkalies. They are often poor, thin, gravelly and light-coloured. The Panch Mahal tract is chiefly characterised by this sandy loam as in the north-west of Godhra and in the Kalol Taluka. In some places as in the south of Halol there are stretches of rich black soil also.

The soils of the second group are derived from the sub-aerial weathering of the basic lavas of the Deccan Trap series. It is a residual soil, black in colour. It attains considerable depths and shows no change in colour for a depth of 6 to 10 feet. The ' black cotton soil ' or ' regur ' as it is called, is highly argillaceous and very fine-grained, containing a high proportion of calcium and magnesium carbonates and iron. The proportion of lime, magnesia and alumina is fairly high, while phosphorous and nitrogen are poor. The soil is extremely sticky when wet and very tenacious of moisture. These soils are extremely fertile and do not require manuring for long periods. The central parts of Kathiawar and parts of Broach and Surat districts possess very wide stretches of this ' *black cotton soil.*' The different varieties of black soil occupy about three-fourths of the whole cultivable area of the Broach division ; while in Surat they occupy a central belt stretching north-south as a narrow strip.

The soils of the third group have chiefly resulted from the weathering of calcareous and sandy rocks. These soils are not so compact or homogeneous as in the case with other types. The soil varieties of this group are chiefly encountered in some parts of Cutch and in the marginal tracts of Kathiawar.

The soils of the fourth group fall chiefly under two different heads : (*a*) river-alluvium and deltaic alluvium and (*b*) desert-deposits. The big rivers of Gujarat—the Sabarmati, the Mahi, the Narbada, the Tapti—and other small rivers have contributed considerable quantities of silt in various degree of fineness forming flood-plains, deltas, etc. These flood-plains and deltas have given rise to rich fertile soils and contribute a large share of the agricultural wealth of the province. It is a type of ' drift soil,' which gets periodically renewed and is, therefore, generally very fertile. The Sabarmati alluvium soils in the Ahmedabad district is very rich in yielding crops. These soils are deep so that the plants can spread their roots deep and draw fully on the vast stores of plant foods present. The district of Kaira is a lowland country lying between the rivers Sabarmati and Mahi. Besides these two large rivers the country is watered by several small streams. The land in the centre is a tract of the most fertile soil of the Indo-Gangetic type, also called *Goradu* soil. It is further classified as light or *gorat*, medium or *besar*, black or *kali* and alluvial or *bhatha*. The light or *gorat* is the prevailing soil of the district, varying from loose-grained yellow sand of the fields near the Sabarmati and the Mahi to a rich light brown found in central talukas and in the south-west corner of Matar. The rich variety is known as *goradu besar*. Under medium or *besar* are several soils varying from heavy sands to light clays. Soils of this class are distributed all over the district but nowhere are they found over large areas. As a rule, the black or *kali* soil is poor, and scarcely ever deep. Along the rivers there are soils called alluvial soil or *bhatha* formed from silt. All these soils vary in colour from light ash to rich brown, and they do not crack. They are very suitable for irrigation and much of the best well-irrigation of the Province is on this land.

Going further south in the district of Broach, the sea-side country of Vagira, Jambusar and Amod reveal light soil *gorat* varying from the consolidated sand-drift in the south of the district to the heavier lands merging into rich alluvial soil of

bhatha. *Gorat* occupies in the north nearly one-third of Jambusar Taluka. The soils of the tract comprising the Broach and Surat districts are of three types : (*a*) the *bhatha* soils, (*b*) the *gorat* soils, and (*c*) the *kiari* soils. All these soils are of alluvial character. The *bhatha* soils are red, brown or chocolate in colour. They are alluvium deposited by rivers during high floods. The fertility of these soils may be renewed every year by fresh silt. These soils are found in belts along the Tapti and Narbada banks. They grow excellent irrigated crops. Old *bhatha* soils are found sometimes away from the present rivers. They are called *gorat* soils. They are alluvial in character and are suited for irrigation. *Kiaries* are rice soils in low-lying areas, receiving drainage from the surrounding country.

Desert deposits are a common feature of the Thar or Rajputana desert being covered under a mantle of sand blown in from the coastal regions with sea-salt. Extreme coastal margins of Gujarat and Kathiawar and parts of Cutch also share this character but only to a very small extent, the soils of these areas being particularly sandy in character.

EXPLANATIONS OF THE FIGURES.

Fig I.

The land of Gujarat as we see it to-day became demarcated only very lately when its geological evolution in its present existing form is considered. Even during the recent geological past or should we say during the historical period Kathiawar existed as an island when it was separated from the mainland of Gujarat in the north-east by a strip of land called Nal-Kantha ; it represents what was once a continuous gulf connecting Bay of Cutch and Gulf of Cambay. The figure also shows areas of local upheaval and subsidence along the coasts of Kathiawar, Gujarat and Bombay. Places which have been affected by earthquake shocks during historical period are also marked.

Fig. II.

The two great seas—the Tethys and the Southern Sea—of the Jurassic and Cretaceous periods encroached upon the continent of India at this time. The figure shows the present land of Gujarat and the Narbada valley regions innundated by the waters of the Tethys.

Fig. III and Fig. IV.

The world of the Jurassic period was altogether different from the world of to-day. The distribution of land and sea masses in those days was something like the one shown in Fig. II. The world was divided into northern and southern hemispheres, being separated by the great sea---the Tethys. During this period many land-areas were occupied by the arms of the seas. It is observed that the Jurassic age was probably the period of most extensive marine transgression known in the whole history of the earth. It was made possible by the great extent of the country which had been peneplained during the long continental interval ; for this provided extensive flat areas, over which the sea could transgress, as it rose during the Jurassic

ROCK TYPES	Geological Periods.	Age in millions of years.		Life.	Economics.
Black cotton and other soils of Southern Gujarat. Estuarine and gulf deposits of north Gujarat between Baroda, Ahmedabad and Eastern Kathiawar. Alluvium of modern rivers.	Human or Recent.	0.25		Rise of modern man. Development of modern kinds of mammals. Extinction of primitive types of mammals.	Black cotton soils and other soils of Southern Gujarat.
Older alluvium. Narbada and Sabarmati river alluvium bearing human artefacts. Porbander stone.	Pleistocene (Dawn of the Stone Age).	2	2	Appearance of primitive man. Human relics of stone, metal and bone.	
Coastal deposits of Kathiawar. Dwarka beds. Perim Island deposits.	Pliocene, Miocene and Oligocene.	24	58	Fossil pigs, elephants, ruminants, carnivore, mammals, etc.	Semi-precious stones like agate, chalcedony, onyx, moss-agate, heliotrope, bloodstone in Rajpipla, Kapadvanj, Tankara. Acid, basic lava rocks as building stones, and road-metal in Eastern Gujarat and Kathiawar; limestones of Tarkeshwar and Kathiawar. Gypsum in Cutch. Porbander stone in Kathiawar. China clay in Kathiawar.
Gypseous and carbonaceous shales and sandy limestones of Cutch. Nummulitics of Surat and Broach. Deccan Trap volcanic outbursts of Kathiawar and Eastern Gujarat.	Eocene	34		Modern flowering plants throughout the Tertiary. Appearance of modern species of molluscs. Beginning of modern types of mammals.	
Lameta beds—Siliceous limestones and sandstones of Kushalgar-Banswara, Jhalod, Sunth Panch Mahal, Dohad, Balasinor and Lunavada. Bagh beds—Conglomerates, sandstones, shales and limestones of Panch Mahals, Wadhwan, Vajiria, Naswadi, Boriad, Chhota-Udepur and Rewa Kantha. Ahmednagar sandstone—Sandstones, shales and conglomerates of Dhrangadhra, Songir and Western Rajputana. Nimar Sandstone—Gritty sandstone occurring to the south-east of Pavagarh hill.	Cretaceous	55	60 110	Appearance of flowering plants. Culmination of reptiles and cephalopods. Fossils of molluscs, ammonites, corals, extinct land reptiles, turtles, fish. Fossil plants—dicotyledons.	Songir sandstone of Baroda used as millstone. Ahmednagar sandstone of Dhrangadhra.
Sandstones, shales and limestones of Dhrangadhra in Kathiawar, Patcham, Chari, Katrol and Umia in Cutch and Rajputana.	Jurassic	30	170	Great development of many kinds of reptiles. First appearance of birds. Mammals, small and rare. Development of non-flowering plants. Fossils of ferns, cycads, conifers.	Limestones and sandstones of Cutch. Stray coal deposits of Cutch.
Sandstones of the Umia series of Cutch and Dhrangadhra and Wadhwan.	Gondwana (Jurassic)		730		
Unconformity—Geological record missing.				No fossils, but indications of life.	
The first metamorphosed sediments—limestones, marbles, schists, slates, quartzites of Rajputana, the Aravallis, Champaner, Palitana, Gogha. Intrusive granites of Mt. Abu.	Dharwar	900	900 900	Unfossiliferous—no evidence of life.	Motipura marble and granites of Baroda. Manganese deposits of Panch Mahals (Shivrajpur). Productive horizon carrying the valuable minerals, metals and gems.
Granite and gneisses—the Fundamental Complex or the basement rocks of north-east Gujarat.	Archœan		1800		
No known geological record. Cosmic Time or Formative Era.					

Chronological table depicting the rock-types of the different geological periods together with their respective age, animal and plant life and economic aspects.

period. Beginning at the several epi-seas the transgression filled the geosynclines (*e.g.*, the Himalayan geosyncline), extended over the marginal platforms and swept the country in one gigantic flood that spelt destruction to all animal and plant life in its path. During the Cretaceous period the Indian continent was similarly affected by marine transgression along its coastal periphery (also see Fig. II). Its impress is today found mainly in the land of Gujarat and on the eastern coast of India. It was the last great inundation.

After its retreat, the Gondwana land (joining South America, Africa, India and Australia) became subjected to the process of dismemberment, beginning with the opening of the South Atlantic between Africa and South America, widening as the latter land block drifted westward. This increased, step by step, with increase in size of the Atlantic, until finally the arrangement of lands and seas that we are familiar with came into existence. The Cretaceous period ended with the complete withdrawal of the waters from all the geosynclines. India and perhaps Australia also probably did not break away from the main mass of the Gondwana continent until Tertiary time. The Tertiary period of the earth's history is principally the history of the separate continents which had come into existence by the opening of the Atlantic rift. Eurasia was still a unit, though the Indian Ocean had probably begun to open on the south.

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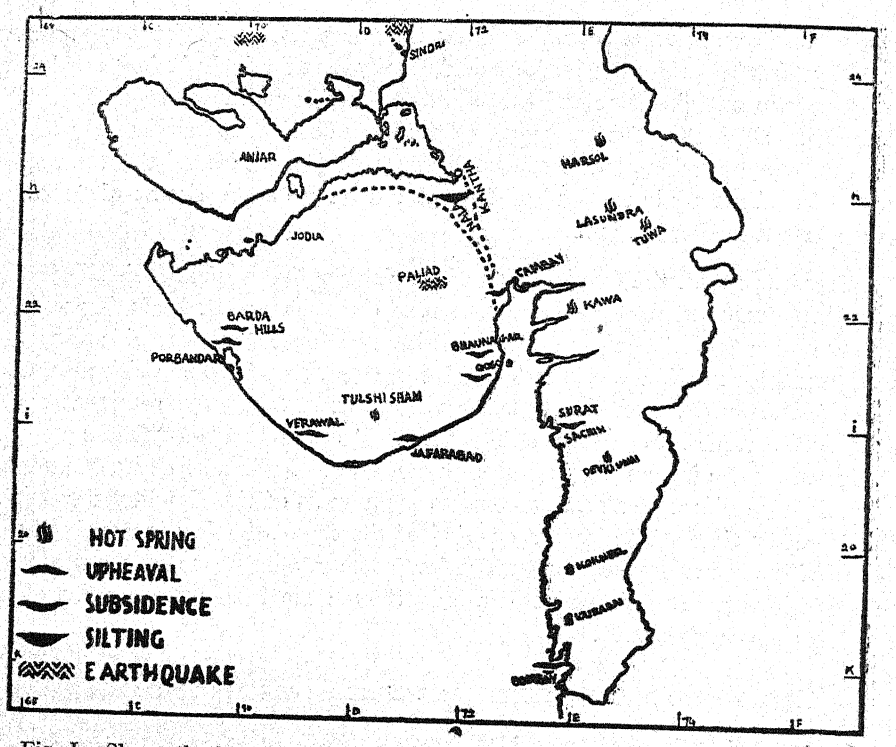

Fig. I.—Shows the land of Kathiawar as a peninsula in the recent geological past.

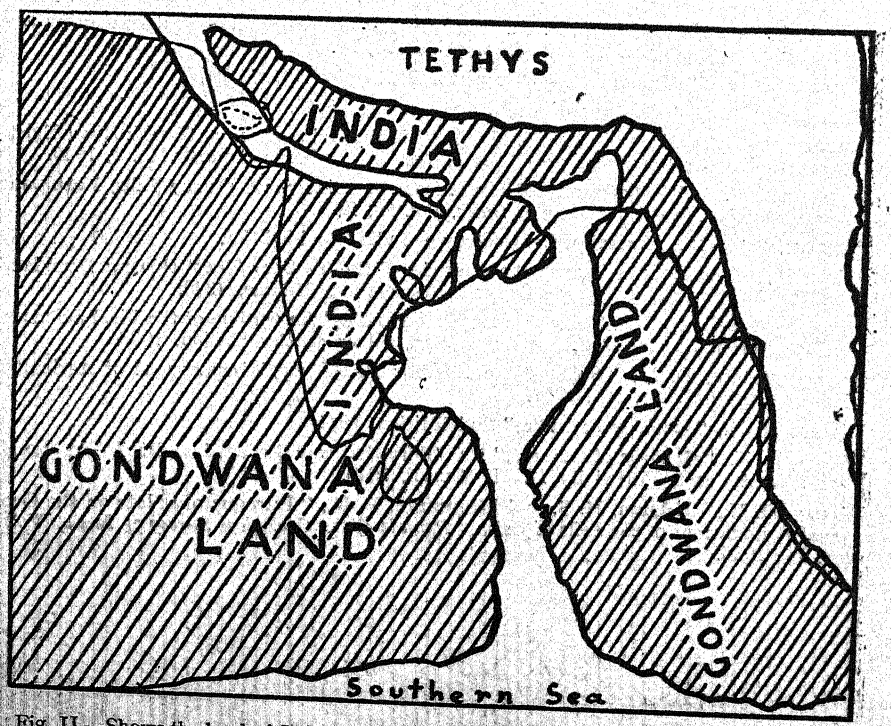

Fig. II.—Shows the land of Gujarat and the Narbada Valley inundated by the waters of the Tethys, the great Mediterranean of the geologists.

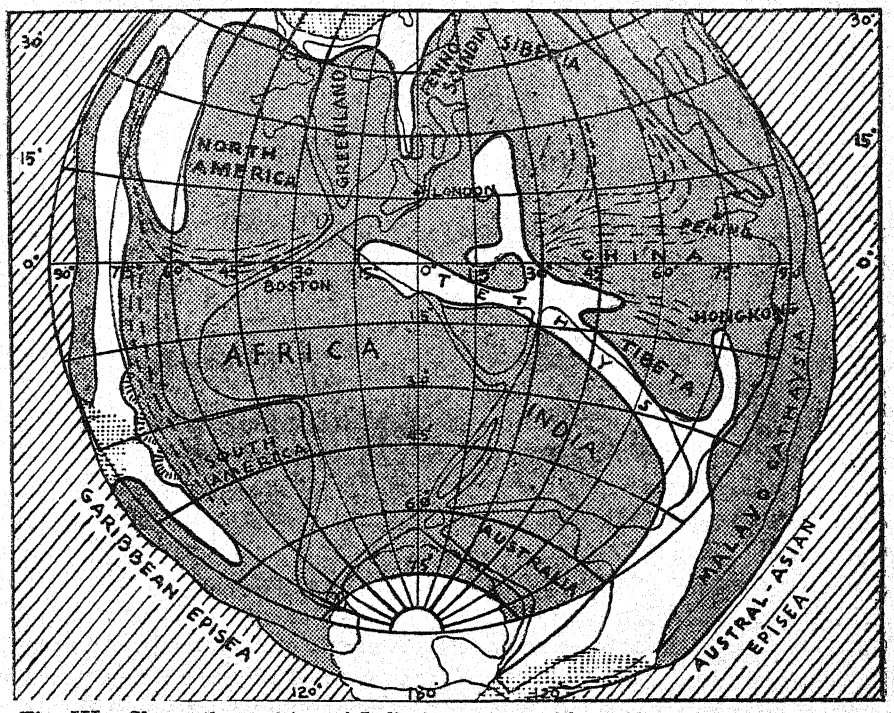

Fig. III.—Shows the position of India in context with world geography about 100 millions years back when India was connected with America, Africa and Australia forming the Gondwana land of the geologists.

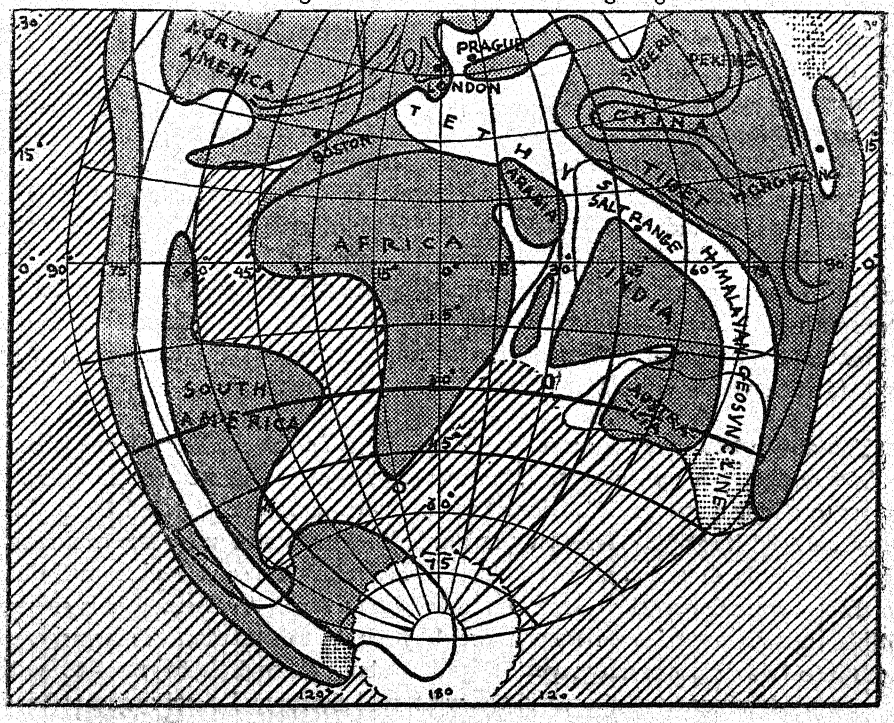

Fig. IV.—Shows the Gondwana land in the process of dismemberment separating India from Africa. The Arabian Sea of to-day thus came into existence somewhere about 80 million years back.

THE LANGUAGE OF GUJARAT

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1. *Boundaries of the language :* One of the most important factors that have contributed to the cultural unity of Gujarat is its language, called the Gujarati language which is the spoken language all over Gujarat. The linguistic boundaries, however, of the Gujarati language are more extensive than the political ones of Gujarat. In Cutch, Gujarati is the court-language and the language of education and culture ; there it is steadily superceding the vernacular, Cutchi, which is a branch of Sindi. In Sind, it has penetrated as far as Mitthi, about 30 miles due north beyond the great desert of Cutch. Here it mixes with Sindi with which, linguistically speaking, it is not very closely related. From Mitthi, the boundary line runs almost in a straight line due east and reaches the B. B. and C. I. Railway line at Shree Amirgadh, a taluka town of Palanpur State and a few miles south of Abu Road. All along this line it comes in contact with Marwari, a language closely allied to Gujarati and with its dialects spoken in Sirohi and Danta, and imperceptibly merges with these forms of speech. From Shree Amirgadh, the boundary goes north-east beyond Mahikantha and Idar, and then turns south-east reaching Dahod, including within the Gujarati-speaking area, the State of Lunawada, and Jalod. From Dahod the line goes south slightly inclined to the west bringing within the Gujarati area the States of Chota Udepur and Rajpipla. Throughout this boundary, *i.e.,* from Shree Amirgadh to a few miles south of Rajpipla State, the Gujarati comes in contact, and gradually and imperceptibly merges into the various Bhili dialects. From Rajpipla, the line goes south beyond the whole of Surat district and the forests of Dangs. Here it meets Khandesi, a dialect of the Western group to which Gujarati also belongs. With Khandeshi, Gujarati merges imperceptibly. The line then runs straight to the west for about 35 miles reaching the Arabian Sea at Umargaon, a few miles south of Daman. Here Gujarati comes in contact with Marathi in the east and makes a mixture of dialects in that area ; and towards the sea, it mixes with Konkani with which Gujarati is more allied.

The above boundary is more or less the same as the traditional one given by Sir George Grierson and others. But modern research and further investigations lead us to adopt a few modifications therein, which are briefly stated here. When one actually visits these places on the Borderline, he is struck by the arbitrariness with which Bhili dialects and the dialects of Khandesh are separated from Gujarati. The change from Gujarati to Bhili and, towards the south, to Khandeshi is so imperceptible that an experienced linguist would hesitate to partition the homogeneous speech into two different languages. The fact about these dialects seems to be that they are predominantly Gujarati in the west, and slowly and slowly tend to become

Rajasthani and Marathi respectively as we proceed to the east and south. The Bhili dialects for example, are Gujarati as far as Jara (south of Udepur), Dungarpur, Banswada, Ali-Rajpur and Barwani to the east, and they become slowly and slowly more akin to the different neighbouring Rajasthani dialects as we go further to the east. Similarly, the so-called Khandeshi is nothing but a form of Surti Gujarati as far as Nandurbar and Pimpalner; and it assumes the Marathi form slowly and slowly until at last it definitely becomes a form of Marathi at Dhulia. The revised boundary line of the Gujarati language should, therefore, run as follows:—From Mitthi in Sind to due east covering portions of Sihrohi and Danta States and reaching the B. B. & C. I. Railway line beyond Abu Road; then touching Jora in Udepur and including Dungarpur, Banswara, Ali-Rajpur and Barwani States; cutting the Ratlam Railway line between Amargadh and Panch Piplye, including Jhabua, Chhota Udepur, cutting Shahda, including Nandurbar, passing through Pimpalner and joining Peint beyond the Dangs. From there it turns due west where the country is bi-lingual, Marathi and Gujarati spoken by Marathi and Gujarati peoples respectively, making a heterogeneous mixture; and near the Arabian Sea it fuses with Konkani with which it is more akin. This state of things persists to a greater or less extent as far as Bombay.

Beyond this area there are many other big towns and cities in India and abroad where large colonies of the people of Gujarat speak the Gujarati language. The most important of them are Bombay, Calcutta, Karachi, Madras, Lahore, Nagpur, Rangoon, Hyderabad (Deccan), etc., in India; and Janjhibar, Nairobi, Port Durban; Java, Hongkong, Pennang; Paris, London, Amsterdam; New York, etc., outside India. In many of these settlements, there are Gujarati schools and other institutions of the culture of Gujarat where traditions of the Gujarati language are maintained, cultivated and inculcated to children. Of all these Bombay is so powerful that it often sets its standards which serve as models for Gujarat proper.

There are besides, some wondering tribes in the Punjab, Kashmere, Rajputana, etc., which speak dialects which have closer affinity with Gujarati than with any other language of India. They are, therefore, considered as the dialects of Gujarati:

Following figures give a rough estimate of the total Gujarati-speaking population.

People of Gujarat, including Kathiawar but not Cutch	13,300,000
Peoples of the Borderlands, including Cutch	3,500,000
Peoples in the remaining parts of India	1,500,000
Peoples abroad	500,000
Wandering tribes	3,000
	1,88,03,000

[NOTE :—Recent migrations of Hindus from Pakistan into Gujarat and Bombay will swell this figure considerably; for many of them will permanently settle in Gujarat and adopt the Gujarati medium].

2. *The Position of Gujarati in the Scheme of Indo-European Languages* :—Gujarati, like Hindi, Punjabi and other sister-dialects of modern India, is derived from the Old Indian language, also called the Indo-Aryan, the oldest literary form of which is recorded in the Ṛgveda. This Old Indian is a sister-language of the Old Iranian recorded later on in its literary form in the Gāthic parts of Avestā and in some Old Persian Inscriptions. The Old Indian and the Old Iranian together with a few old dialects of Mesopotamia and Asia Minor, called Mittani, Manda, Kassites, etc., most of which are now dead, complete the Aryan group. Much information is not yet available about these dialects, but what little is known about them enables us to locate their position in the classification of the languages of the Aryan branch. This Aryan branch is one of the branches into which the Indo-European language split up in pre-historic times. Besides the Aryan branch, the Indo-European has the Greek, the Italo-Keltic, the Germanic, the Slavo-Baltic, the Albanian and the Armenian branches with many sub-branches for each which have now spread over a large part of the civilised world. In order, therefore, to understand the proper place which Gujarati occupies in the scheme of the Indo-European languages, it is necessary to have a look into its short history and to see how, after passing through the various stages in its development right from the Indo-European, it came to assume its present form.

3. *Results of Comparative Method Applied to the I. E. Languages* :—It must be stated at the outset that there is not as yet discovered a single word written in the I. E. language. Philologists have toiled for three generations to arrive at certain results by comparing the various Old and Conservative languages like Sanskrit, Greek, etc., and have discovered certain linguistic correspondences on the strength of which they are able to 'reconstruct' the Old I, E. languages. The comparisons have revealed some valuable and reliable information not only about the I. E, language but also about the common habitation and civilization of the I. E. people and their journies to various parts of the world after their separation from the common habitation.

Semantic studies of Indo-European words have yielded additional and important information about the stages of development in the I. E. itself, and investigations into its loan-words borrowed from the neighbouring languages, the history of which is known to us, have resulted in providing us with information about the different cultural contacts in which the I. E. people came in their undivided habitation. The study of loan-words in the I. E. has also enabled us to arrive at an approximate date when the I. E. people lived together and when, finally, they parted.

Without attempting to sketch the various theories about the original home of the I. E. people, their approximate time and the reasons why they finally parted, it will be quite sufficient for the purpose of this short sketch if we state below only the conclusions which have found favour with a majority of I. E. philologists.

4. *Sounds of the Indo-European Languages* :—Either in Asia Minor or in further North-West in the Kirghiz Steppes north of the Aral Sea, some time before the middle of the third millenium B.C., the Indo-European people lived together united by a common language and common religion and culture. Their language consisted of a

large variety of vowels, vowel diphthongs and consonants with the stop-element preponderating over the spirant. There were at least four series of stops : the Voiceless stops : *p,*t, *k_i, *k^w ; the voiced *b, *d, g_i, *g^w ; the aspirated voiced : *bh, *dh_i, *g_ih, *g^wh ; and the aspirated voiceless, which were of rare occurrence : *ph,*th, *k_ih and *k^wh. Arranged in accordance with their places of articulation, they present the following series : labials : *p, *b, *ph, *bh ; dentals : *t, *d, *th, *dh ; pre-palatals : *k_1, *g_1, *k_1h, *g_ih ; and post-palatals : *k^w, *g^w, *k^wh, *g^wh. There was at least one sibilant s which was unvoiced generally, but its voiced variety existed under certain combinations. The proper vowels were : *e, *$\bar{e}$; *o, *$\bar{o}$; *a, *$\bar{a}$. There was, besides, a class of sounds called sonants which played the double role of vowels and consonants in accordance with the different combinations in which they figured. Thus : (1) They assumed consonantal roles of *y, *w, *r, *l, *n and *m initially and under certain other conditions. (2) Coming after the proper vowels they formed diphthongs namely, *ei, *eu, *er, *el, *en, *em; *oi, *ou, *or, *ol, *on, *om ; *ai, *au, *ar, *al, *an, *am ; *ei, *$\bar{o}$i, *ai, etc. (3) In the capacity of vowels they appeared as *i, *u, *$\underset{\cdot}{r}$, *$\underset{\cdot}{l}$, *$\underset{\cdot}{n}$, *$\underset{\cdot}{m}$. (4) They assumed a sort of intervocalic role when a short vowel, designated by the symbol *°, developed before them, where they happened to be followed by the proper vowels. Thus they appeared as *°ye, *°we, etc.; *°yo, *°wo, etc. and *°ya, *°wa, etc. Besides these phonemes there was a nutral vowel, designated by the symbol *ə.

5. *The Indo-European Grammar Described :*—The Indo-European word consisted of 3 elements (*a*) the root, (*b*) the suffix or suffixes, and (*c*) the termination, all of which consisted of one or more vowels or consonants or both. In the various forms of the same word, each of the proper vowels *$\breve{\bar{e}}$, *$\breve{\bar{o}}$ or *$\breve{\bar{a}}$ occurring in roots, suffixes or terminations was liable to be substituted by the other or to be eliminated altogether. This gave rise to the phenomenon, described by the philologists as the *Vowel gradation.* There were two main grades in this system, the high (containing the vowels $\breve{\bar{e}}$ or $\breve{\bar{o}}$) and the low (containing the vowel a or zero). But occasionally, the low grade distinguished two sub-grades, the middle (containing the vowel a) and the zero-grade (containing no vowel at all). Combined with sonants, the grades assumed different forms like—

	High grade.	Low grade :	
	ei or oi	i	
	eu or ou	u	
	er or or	$\underset{\cdot}{r}$	
	em or om	$\underset{\cdot}{m}$;	also we get the combinations
like the following :	we or wo	u	
	re or ro	$\underset{\cdot}{r}$, etc.	

There were cases where a sort of gradation in consonant and in sonants was observed, but they were of rare occurrence. Coming to Grammar, the Indo-European words consisted of two large classes : (1) The nouns, consisting of substantives, adjectives, pronouns, numerals, and participles. (2) The verbs, including the finite verbs and participles. There were separate verbal themes for tenses and moods. The tense-themes were (*a*) the present-theme, (*b*) the Aorist-theme and (*c*) the perfect-

theme, each of which was arrived at in different ways either by addition of suffixes and infixes or by reduplication. The model themes were made from the temporal ones by adding a further suffix for each special mood. The terminations were either primary or secondary and were in many cases different for the Present-Aorist System on the one hand and for the Perfect-System on the other. There were two broad classes of verbs, the thematic class to which a vowel like -i was added before applying the terminations, and the a-thematic class to which the terminations were added directly. Tenses denoted time as well as aspects. There was, besides, a large class of derivative verbs, such as the nominal verbs, the passive, the causal, etc., derived from the primitive verbs by adding different suffixes with or without radical modifications. The Indo-European verbal system was therefore very intricate. Nouns were arrived at by a large number of primary and secondary suffixes in which two main categories of Agent-nouns and Action-nouns were well-marked. Terminations were added to the nominal bases thus arrived at and they denoted 8 case-relations, including the one-denoted by the vocative, and 3 numbers, including the dual. There were 3 genders: (i) the Masculine, generally representing the male sex in animals or implying the idea of greatness, vigour and grossness, in inanimate nouns. (ii) The Feminine representing the female sex in animals and implying the idea of smallness, tenderness, etc., in inanimate nouns; and (iii) the neuter implying no specific ideas denoted by the Masculine and the Feminine genders. The Indo-European had, moreover, a wonderful way of compounding two or more nouns which gave brevity to the language. There were also the personal pronouns for 3 persons, the demonstrative and the interrogative pronouns. This whole class of nouns was divided into various classes or types for each of which there were different ways of adding the terminations. There was also a pitch-accent which shifted from place to place in the different forms of a word. Coming to vocabulary, there were nouns for parts of body, family relations, animals, trees, objects of culture and faith, and articles of food. There were adjectives for colour, dimensions, shapes, etc., and there were numerals at least up to 1,000. There were verbs or roots, of which more than a hundred have been identified, which denoted various actions and activities.

6. *Dialects in the Indo-European:* In its earlier form, the Indo-European had no dialects, but later on tendencies for dialectical variations came into existence which were ultimately responsible for the rise of well-marked dialects. Some philologists prefer to call the earlier form of the Indo-European as the Primitive Indo-European and distinguish it from the later and better known form called merely the Indo-European. A few isoglossal lines for the dialectical tendencies noted above are as follows:—

(*i*) The treatment of Gutterals or Post-palatals: The oriental group consisting of Indo-Iranian, the Slav, the Baltic, the Armenian and the Albanion languages change the IE *k^w to a sibilant: type, satem; whereas the western group consisting of the Greek, the Italic, the Keltic and the Germanic languages change it to k: type, centum. This change is known as the famous satem-centum change. This differentiation proves that in the IE there were two modes of pronouncing the labio-palatal or as they are often called, the post-palatal stops.

(*ii*) The treatment of IE *ŏ: The Indo-Iranian, the Slav, the Baltic the Albanian and the Germanic languages confounded IE *ŏ with IE *ă̆; but the Armenian, the Greek, the Italic, the Keltic distinguished them. Thus, it is clear that in IE, the eastern group pronounced the vowel *ŏ in a more backward and downward position then did the western group.

(*iii*) The augment existed in Indo-Iranian, Armenian and Greek languages, but not in others.

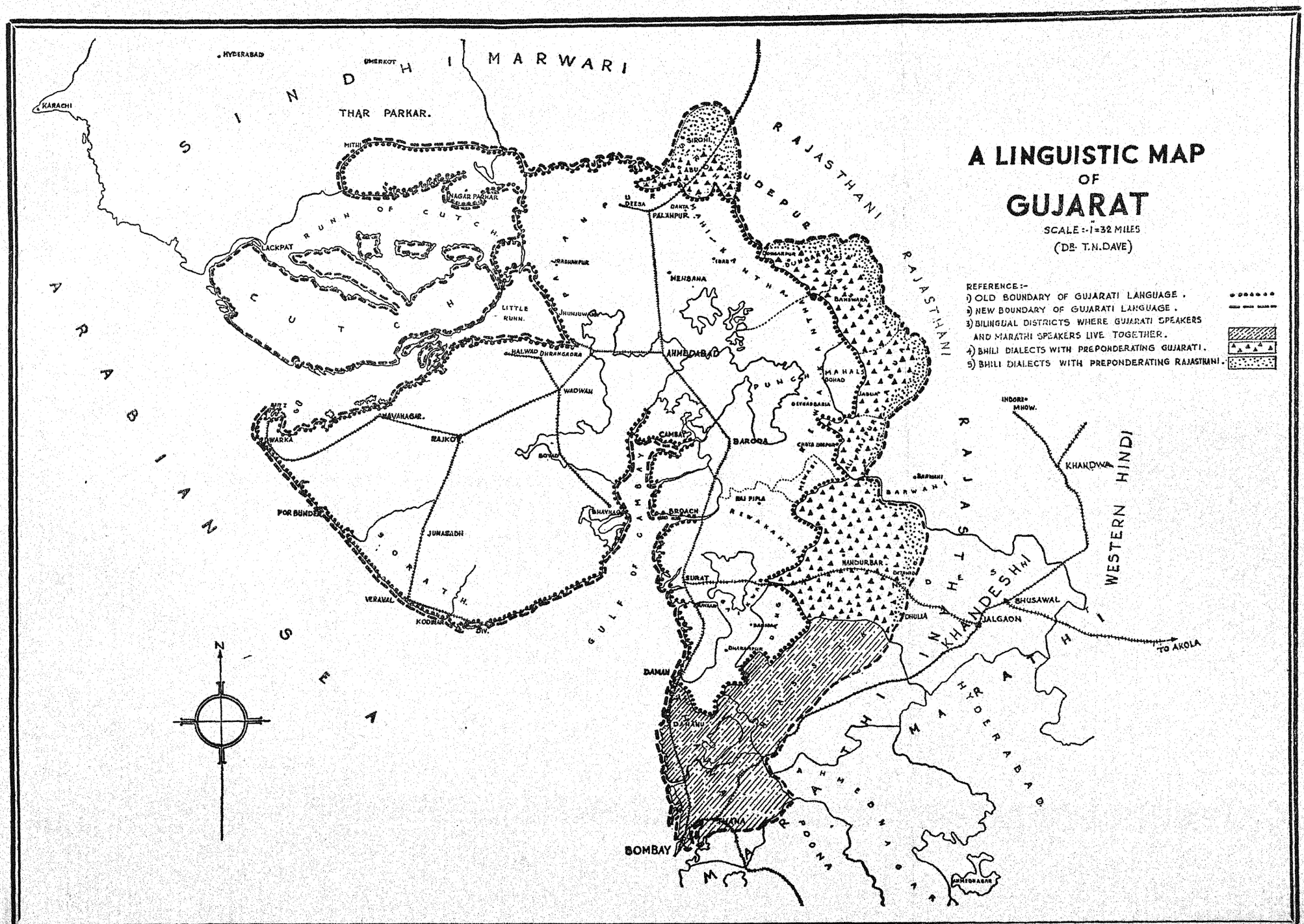
It is interesting to see, in this connection, that the isoglossal lines do not exactly coinside with one another. These tendencies developed more and more prominently and led, later on, to the differentiation of dialects in the IE.—Some writers try to prove that in the Primitive IE stage, there were a few more phonemes such as the glottal stop, some voiced spirants, a stress accent, etc.; but these conjectures are extremely hazardous.—It was during this IE period that the IE people come in contact with the more civilized Summerians from whom they borrowed some words and cultural ideas. The IE word for 'the cow' *viz.* *g^{w}ous for example is proved to be a loan from the Summerians. This was somewhere about 2700 B.C.

7. *The Split in the Indo-European and the three stages of Development:* The first to get away from the common IE habitation were the ancestors of the Hittites. They came to Asia Minor and raised a kingdom there. They were not perhaps numerous enough to impose their language upon the pre-Hittite non-IE people whom they subjugated in Asia Minor, and were ultimately absorbed in them. The next party to secede somewhere before 2000 BC. was a very large group of the Aryans. They followed the same path over which their earlier brethren had gone, but they proceeded further east and established kingdoms of Mittani, Manda, Harri and Kassites in Asia Minor and North-West Mesopotamia. Later on in about 1400 B.C. they came in conflict with the Hittites and had to sue for peace. In the tablets, recording the terms of peace, which are recently discovered by Pof. De Morgan as Boghazkeni, there occur names of gods found in Ṛgveda in the forms of Indra, Mitra, Nāsatyā (Ashvins), written in Babylonian syllabic writing. This is the first and the earliest record in writing, of the IE people. It is true that the undivided IEs did not know the art of writing; otherwise they must have left some written document in some form or shape. Perhaps the IE people were not then so highly cultured. But when they came into cultural contacts later on with their more civilised neighbours, particularly with the Babylonians and the Summerians, they learnt from them the art of writing. Some of these Aryans settled in Asia Minor and Mesopotamia, while a large number of them left the place and entered Iran.

Before entering Iran and during the time when they were leading a more or less settled life in Asia Minor and Mesopotamia, they had already laid the foundation of a civilization which was, later on, called the Indo-Iranian civilization and from which branched off the Indo-Aryan civilization culminating in India in the form represented in the Ṛgveda. The discovery of the Hittite tablets is one of the most epoch-making events in this connection, but the material obtained thereby, is so small and attended with so many difficulties about its discipherment that it has not yet become possible

to settle finally the relation of the Hittite with the IE on the one hand and with the Indo-Iranian on the other. After their arrival into Iran, the Aryans created a literature which has survived in a later form in Avesta, Old Persian and also to a certain extent in the Old Indian. The earliest beginnings of the Vedic literature, not necessarily in the form in which it is found in our present Ṛgveda, must have been made in Asia Minor and the primitive Vedic Pantheon must have already come into existence when the Aryans were still in Asia Minor, for otherwise the occurrence of the names of the Vedic Gods in pre-Indo-Iranian spelling remains unexplained. Some hymns probably existed in old forms, which are either lost or are modernized by generations of oral reciters. Mention of some very ancient tribes in the Ṛgveda also supports this line of argument. We shall, therefore, believe that the language of the Aryans in Asia Minor, Mesopotamia and Iran was the one representing the second stage (called the Indo-Iranian stage) the beginning of which was made in Asia Minor; the first stage was naturally the same as the last IE stage which the Aryans as IE people, brought with them after the IE split. The Aryan language in Asia Minor and Mesopotamia was only an old form of the Indo-Iranian proper, probably not differing from it in many respects. Thus 2000 B.C. to 1500 B.C., might represent the Indo-Iranian stage. Finally, when the Aryans entered India somewhere about 1500 B.C., they brought with them the language developing into the Third stage, similar to the language of the Ṛgveda. This third stage may be called the Indo-Aryan or the Old Indian. It is from this OI that all the Middle Indian and Modern Indian languages and dialects belonging to the Aryan family, are ultimately derived.

8. *The Indo-Iranian stage:* When a language develops, it employs 3 processes: (*i*) It conserves a large part of the old stock; (*ii*) It discards some elements from the old stock; and (*iii*) it creates some new forms of expression. The Indo-Iranian discarded the following old features: (*a*) Short IE vowels, ă, ĕ, ŏ were simplified into ă, and the long ā, ē, and ō were simplified into ā. (*b*) The above change reduced the number of diphthongs to only six: ai, au, ar, al, am, an. (*c*) The IE vowel ə became i. (*d*) The consonants k^w, k^wh, g^w, g^wh developed a palatal tendency of pronunciation before palatal vowels e and i. This gave rise to the famous palatal law of the OI. (*e*) The pre-palatals, k, kh, etc., developed into spirants voiced and unvoiced, ś and ź. (*f*) the dentals became ṣ under the influence of i, u, r and k. It was during this stage, that the foundation of the Vedic Literature that we now possess, was laid on a large scale. The gods Mitra, Varuṇa, Nasatyā, Sūrya and others had come into existence earlier, as noted above, in Asia Minor and Mesopotamia; but the hymns composed at that time in praise of these gods are mostly lost and have in some cases changed their old linguistic form by oral tradition and assumed the form that we find in the Ṛgveda. It was here, *i.e.*, in Iran, that the Aryans came in touch with the Asuras and must have held many friendly and hostile relations with them. They must have borrowed words from the non-Indo-European tribes of Asia -Minor, Mesopotamia and Persia, some of whom were Summerians, Akkedians, etc., mentioned above. The words for 'copper,' 'axe,' in Indo-Iranian are instances of this kind. The acquisition of the art of writing by the Aryans from the non-Aryans has already been mentioned.


A LINGUISTIC MAP
OF
GUJARAT
SCALE :- 1"=32 MILES
(DR. T.N.DAVE)
REFERENCE :-
1) OLD BOUNDARY OF GUJARATI LANGUAGE.
2) NEW BOUNDARY OF GUJARATI LANGUAGE.
3) BILINGUAL DISTRICTS WHERE GUJARATI SPEAKERS AND MARATHI SPEAKERS LIVE TOGETHER.
4) BHILI DIALECTS WITH PREPONDERATING GUJARATI.
5) BHILI DIALECTS WITH PREPONDERATING RAJASTHANI.
SINDHI
MARWARI
THAR PARKAR.
KARACHI
HYDERABAD
OMERKOT
MITHI
NAGAR PARKAR
RANN OF CUTCH
CUTCH
LACKPAT
LITTLE RANN.
RADHANPUR
PALANPUR
DEESA
DANTA
SIROHI
ABU
UDEPUR
RAJASTHANI
MEHSANA
JHUNJHUNU
HALWAD
DHRANGADRA
AHMEDABAD
WADWAN
PUNCH MAHALS
DOHAD
GODHRA
BARIYA
CHHOTA UDEPUR
JAMNAGAR
DWARKA
RAJKOT
CAMBAY
BARODA
BOTAD
INDORE
MHOW
KHANDWA
WESTERN HINDI
BHAVNAGAR
BROACH
BAJ PIPLA
REWAKANTHA
BARWANI
PORBUNDER
JUNAGADH
SORATH
SURAT
NANDURBAR
DHULIA
KHANDESHI
BHUSAWAL
JALGAON
TO AKOLA
VERAVAL
KODINAR
DIV.
GULF OF CAMBAY
DAMAN
DAHANU
THANA
BOMBAY
AHMEDNAGAR
POONA
MARATHI
HYDERABAD
ARABIAN SEA
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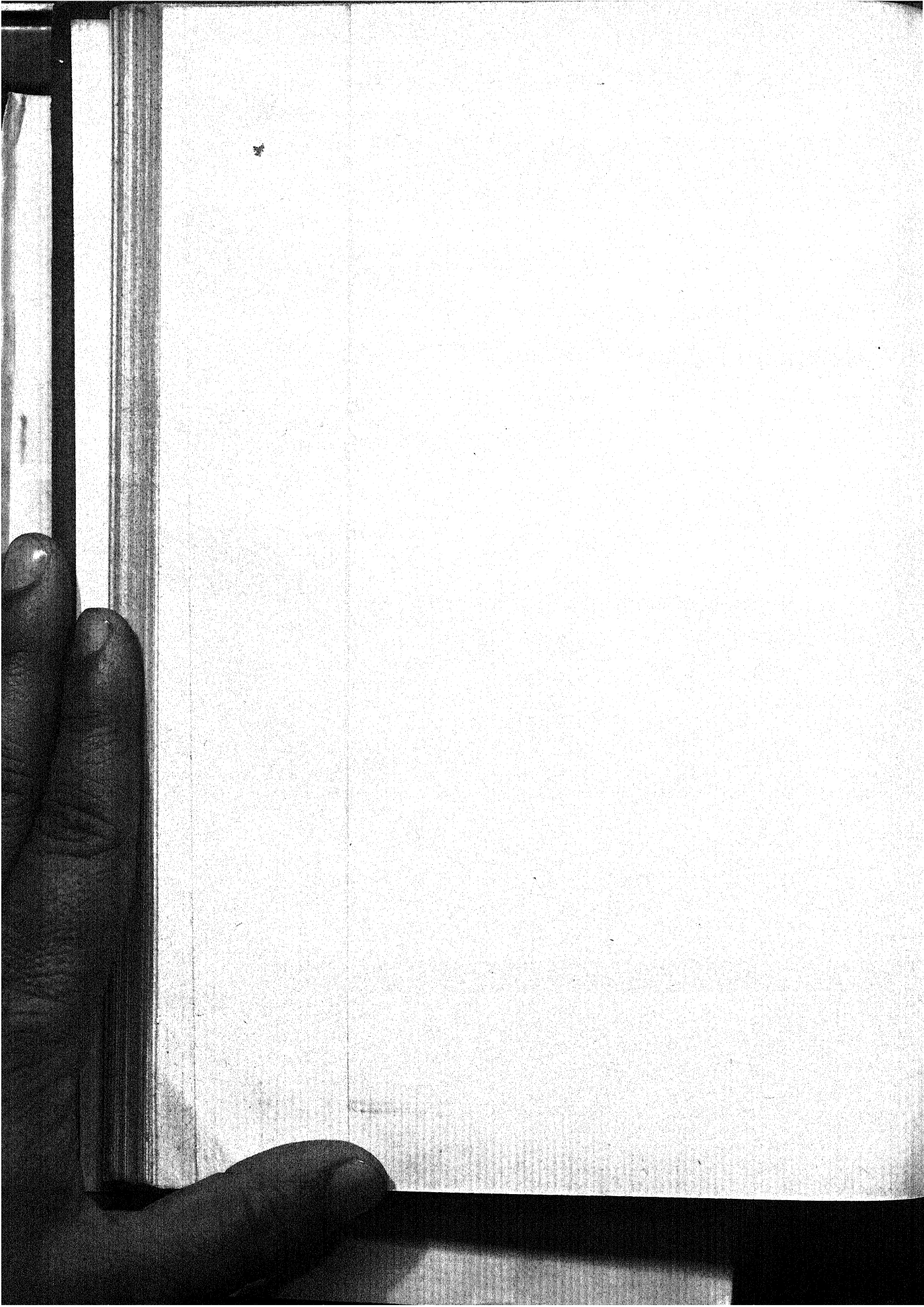


9. *The Aryan Settlements in India :* In about 1500 B.C. a split came once again in Persia between the Deva-worshippers and the Asura-worshippers, and the former left the place for India. Their journey and entrance were slow and gradual, the change of the country was imperceptible especially because they travelled with their families, cattle, etc., and in large numbers. The fauna and flora do not change so suddenly while passing from Iran to India as to remind one of the entrance into a new country. This is probably the reason why we do not get a direct reference in the Ṛgveda to the migration or to the entrance into a new country. In India they first settled in N.-W.F. provinces and the Punjab. The Ṛgveda as we have it today was compiled in its final form in this part of the country. The Aryans must have come to India in many groups and at different intervals, as is attested by the existence of dialectical forms of words in the Ṛgveda. As this stage of the language, *viz.*, the OI stage is of utmost importance from the point of view of the development of the great modern Indian languages including Gujarati, it is desirable that a more detailed account of it should be given.

10. *Innovations in the OI :* The OI differed from the IIr in the following respects : (*a*) The IIr. vocalic groups ai and au were contracted into e and o, an āi and āu shortened into ai and au ; (*b*) the palatalized gutterals were changed to palatals, thus a new series of sounds called the palatals in OI came into existance ; (*c*) the voiced spirants z and ž were lost ; (*d*) an entirely new series of cerebral sounds, called the mūrdhanyas by the local grammarians, came into existance ; (*e*) many grammatical forms and analogical innovations were introduced, *e.g.*, the 2nd future tense, the periphrastic perfect tense, etc. But in spite of these and other changes, the two languages, the Old Vedic and the Old Avestic still present so much resemblance that with the help of a few phonetic rules one can easily convert Gāthā passages into the Old Vedic and *vice versa*.

11. *The OI Grammar :* A brief summary of the important features of the OI are given below :

Phonemes : (1) Vovels : a, ā ; i, ī ; u, ū ; ṛ, ṝ ; ḷ ; e, o ; ai, au

(2) Consonants : stops : velers : k, kh, g, gh, ṅ (the class nazel)
Palatals : c, ch, j, jh, ñ (,,)
Cerebrals : ṭ, ṭh, ḍ, ḍh, ṇ (,,)
Dentals : t, th, d, dh, n (,,)
Labials : p, ph, b, bh, m (,,)

(3) Fricatives : unvoiced : s (dental), ś (palatal), ṣ (cerebral), ⁀ (veler), ⁀ (labial).

(4) Spirants : voiced : h ; unvoiced : ḥ.

(5) Pure nazel : ṃ (anuswāra).

(6) Semivowels : y (palatal), r (cerebral), l (dental), v (labial).

Morphemes : There are 3 classes of words (*a*) the nouns, including the substantives, the adjectives, the pronouns and the numerals. (*b*) The verbs, including the temporal and modal forms and the Participles. (*c*) The Indeclinables, consist-

ing of prepositions, post-positions, adverbs, conjunctions, particles, etc. The *Nouns* distinguish 3 genders, the Masculine, the Feminine and the Neuter. Gender is mostly irregular in the OI there being but few rules to find it out from the external forms or from the meaning. The Nouns also distinguish 3 numbers, the singular, the dual and the plural, and 8 cases, the Nominative, the Accusative, the Instrumental, the Dative, the Ablative, the Genitive, the Locative and the Vocative. The noun-stems are arrived at by applying certain suffixes of which those forming the agent-nouns and the action-nouns are outstanding. The noun-stems end in consonants and vowels. The stems ending in consonants are changeable or unchangeable when case-terminations are applied to them. This class of nouns particularly the one which contains some radical stems is very old and has steadily diminished in number and importance during the development of the Pr. OI into the later OI. The nouns ending in vowels group themselves into 5 types : (*a*) those ending in a or ā ; (*b*) those in -i and -u; (*c*) those in ī and ū ; (*d*) those in ṛ, and (*e*) those in -e, ai, au. Case-terminations added to these stems take strong and weak forms for the specific types, while the stem also assumes two or three forms before some terminations in certain types, under the influence of the shift of accent and the consequent vowel gradation. The vowel-ending stems and particularly those ending in a, ā and i ī become so predominant in later phases of the OI that they practically displace many other types. The adjectives have two ways of forming comparison, by adding special suffices, -īyas, īṣṭha and -tara, -tama of which the latter pair is more recent. There are cardinal and ordinal numerals and also a large number of numeral derivatives. In pronouns, there are personal pronouns of 3 persons, the 3rd distinguishing 3 genders, and also the Demonstrative, Interrogative, the Relative, the Reflexive, the Possessive and the Indefinite Pronouns. There are pronountial compounds and derivatives. Pronouns and Adjectives distinguish gender, number and cases like substantives.

Coming to the *verbs*, there are two voices, the *active* and the *middle ;* some roots are conjugated in one only, while some are conjugated in both. There are the following tenses : the *Present*, the *Perfect*, the *Aorist*, the two *Futures*, the *Imperfect* and the *Conditional*. These tenses show time as well as aspect. Besides the *Indicative*, there are the *Imperative*, the *Potential*, the *Subjunctive* and the *Injunctive* (*or the Precative*) moods. Tenses are obtained from temporal stems of the roots and moods are obtained from the modal stems ; these latter are obtained by suffixing a modal suffixes on the top of the temporal stems. The temporal stems are three, the *Present*, the *Aorist* and the *Perfect*. The Present stem is by far the most important of all, as more than all the verbal forms obtained from the other two stems put together are obtained from the present stem alone. It is used for the present-system which includes the *Present* and the *Imperfect* tenses and the *Imperative*, the *Subjunctive*, the *Potential* and the *Injunctive* moods. It is also useful for the formation of the *first future* with an additional suffix and for the present and passive participles. Besides the verbs of the secondary conjugation in-a-, such as the *Desideratives*, the *Intensives*, *Cousatives*, the *Denominatives*, etc., take the *first Conjugation* of the Present stem. In the primary conjugation of the present, the stem for the first conjugation is obtained by adding -a-, -ya-, and -a- to the 1st, 4th and 6th classes of the roots. That for the second conjugation is obtained in various ways.

The second conjugation is characterised by the vowel-gradation and the shift of accent. It consists of the roots of the 2nd, 3rd, 5th, 7th, 8th and 9th classes. Terminations are added directly in this conjugation to the final of the root or to the graded suffixes with stems changing in accordance as the terminations are strong or weak. In the roots of the 2nd class the terminations are added directly ; in the 3rd the root takes reduplication and to the reduplicated root the terminations are added directly ; in the 5th and the 8th -nu- and -u- are added between the root and the terminations ; in the 9th, nā- is similarly added ; while in the 7th class -na- or -n- is infixed in the body of the root, and the terminations are added directly to the final of the root. An augment a- is prefixed to the verbal forms to obtain the Imperfect from the present and conditional from the future.

The *perfect stem* is obtained by various types of reduplication of the root and is useful for the perfect system. The reduplicated form of the root is also used for conjugating the 3rd class of roots in the present system as noted above, and for getting the Desiderative, the Intensive and one variety of the Aorist. The OI *Aorist* is augmented, it takes the secondary terminations and has moods and participles. The Aorist stem is obtained in various ways. The one for the sigmatic variety is formed by inserting -s- with or without an added -a- between the root and the ending. That for the second aorist consists of the mere root or the root plus a connecting -a- added to the simple or to the specially reduplicated, root. There are 4 forms of the first aorist and 3 of the second. The aorist stem also yields the *Benedictive* and the *Precative* which latter is its optative form obtained by adding -s- after the modal suffix. The modal forms of the aorist are not numerous. There are *two futures* in the OI, the *simple* and the *periphrastic*. The stem for the former is formed by adding -sya- or ' iṣya- to the root with present terminations added on to it. This future has a participle and an augmented conditional. The periphrastic future is obtained from agent-nouns in -tṛ. The -tā- or -itā- is added to the root and then the forms of the verb ' to be ' are added on in the 1st and 2nd persons only. *The passive* takes the terminations of the middle voice and differs from it in the present system only and in the 3rd prs. sg. aorist. In the present system it is obtained by adding the suffix -ya- to the root in its weak form and conjugating it in the middle voice.

As the *OI participles* have played a very important role in the formation of MI languages, we give below a somewhat detailed description of the same. *The Active present, future and aorist participles* are obtained by adding the suffix -ant to the present, future and aorist radical stems respectively ; as : bav-ant pres. p. ; bhav-iṣy-ant fut. p. ; vid-ant, sak-ṣ-ant aor. p. The active *perfect participle* is formed by adding -vāṃs to the perfect stem which is always reduplicated : cakṛvāṃs, tasthi-vāṃs. The *Middle and Passive Participles :* The future middle, the pres. pass. and the present middle of the first conjugation are formed by adding—māna-to the respective stems, *e.g.*, kar-iṣya-māṇa- fut. mid. ; gam-y-māna pres. pass. ; labha-māna- pres. mid. Of the roots of the 2nd conjugation the pres. part. is obtained by adding -āṇa- to the pres. stem : juṣ-āṇa-, bruv-āṇa-, pu-nā-āna. The *perf. middle* is also formed by adding -āna to the weak perfect stem : ūc-ānā-, cakr-āṇa- etc. The *pref. pass. part* is formed by adding -ta or -ita to the root or by the suffix na : -yā-ta, ji-ta, bhī-ta, sṛṣ-ṭa ; lī-na, dū-na, hī-na, etc. The -ta often has an -i- prefixed to it in case of many roots :

lī-na, dū-na, hī-na, etc. The -ta often has an -i- prefixed to it in case of many roots: nand-i-ta-, rakṣ-i-ta-, pat-i-ta.—The *perf. active participle* is obtained by adding -vant to the perf. pass. part: aś-i-ta-vant-.—The *future passive part* is formed by many suffixes: (i) by -ya, bhav-ya, nav-ya; (ii) by -āy-ya, panāyya; (iii) en-ya: var-eṇy; (iv) -tvā (to be pronounced as -tuvā): kar-tvā; (vi) by -tavya: jan-i-tavya hiṁs-i-tavya; (vī) and by -anīya: ā maṁtra-aṇīya-.—The *Indeclinable participles* are obtained by adding (i) -tvī: kṛttvi bhū-tvī; (ii) -tvā: dat-twā; (iii) -tvāya: vṛ-tvāya. To roots with prepositions, the suffix -yā is added to obtain this participle: abhi-kram- ya- ni-cāy-ya; or -tyā: abhi-ji-tyā, ā-dṛ-tyā.—The *Infinitives* in the OI are the various fossilized case forms: (i) Dative: dṛ-ṣ-e, milh-e, bhuj-e; cakṣa-se, maha-ye, vīta-ye, (ii) from -tu- dative: e-tave, o-tave, pā-tave; e-tavai, gantavai, yam-i-tavai; from (iii) -dhyu- dative: iy-adhyai; from (iv) -man dat.: dhar-maṇe; (v) from -van dat: dāvane; (vi) Accusative in-am: s'ubhaṃ (vii) accusative in -tu: praṣṭum, kar -tum. (viii) Abl-gen. of -tu-: gan-tos, dātos. (ix) from loc: dṛśi, dhartari; also loc. of -san-: ne-ṣani.

Among the *Derivative verbs* are (i) the *Causatives* arrived at by the suffix -aya, in general and -paya- from those ending in -ā: ved-aya-, dā -paya-; (ii) *Desiderative-* and (iii) *Frequentatives* obtained from the reduplicated stems car-kar-ī-ti, ji-gam-iṣ-a-ti. (iv) The *Denominatives* are obtained by adding -ya- to the nouns: vasū-ya-ti-śatrū-ya-ti, etc.—*Adverbs* like bhūyo, *Conjunctions* like ca, *post-positions* like prati, *prepositions* like ā, *particles* like na do not require special treatment.

The OI had a *pitch accent* with at least 3 grades, the high, the low and the middle, which shifted from place to place in the word. But it was practically lost during its last phase. It had the wonderful capacity for compounding two or more words in different relations to form one declinable unit.—Two well-marked stages can be easily distinguished in the OI: (1) The older one represented in the language of the ṛgveda and (2) the later one represented in the language of the Brahmaṇas, Upaniṣads and that embodied in the Grammar of Pāṇini.

12. *Dialects in the OI.*

This OI had at least 3 dialects: (i) In one, the IE*r and *l were treated as r; this is the north-western dialect, akin to that of the Avesta, on which the literary form of the old portions of ṛgveda is based, (ii) In the second, the IE *r and *l were treated as l. This was the dialect of the south-east of the Punjab and was removed more or less from the centre of the then Aryan culture. (iii) In the third dialect, which was probably the central, the IE *r and *l were held apart; or this dialect was a result of the mixture of the above two. This last is the Sanskrit of Pāṇini. The OI stage lasted from about 1200 B.C. to 600 B.C.

13. *Development of Early Middle Indian Dialects.*

OI was changing earlier and more rapidly in the outskirts, *i.e.*. in the east and in the south while it was still being spoken in a purer form in

the North-West, and in the Punjab, which were, so to say, the centres of linguistic culture and radiation. The Aryan population was thickest there and the linguistic traditions continued to exist there in a purer form for a longer period than in the East and South where the Aryans were slowly but steadily advancing and at every stage were getting proportionately thinner in number in the midst of and while mixing with, the Non-Aryans, speaking foreign tongues. The task of these borderland Aryans was therefore a difficult one. They had to preserve the purity of their language against odds and had to impose it upon them. Migrations to Saurastras in the West, were quick on account of the shortness of the distance from the centre, and the to-and-from communications were frequent. They were also made by large groups as is seen from kṛṣṇas story, and the settlements were more compact on account of the small area of the Saurastra land; whereas in the east, the case was totally different. There was a vast land for the Aryans to be scattered over, the distance from the centre increased as they progressed farther east and communications with the centre must have been seriously handicapped. The linguistic traditions, therefore, changed earlier and more rapidly in the east than in the west, and in the south. In the centre also the language was changing, but the changes were few and slow. In this way, a pure form of OI was still in common and free use in the Punjab during the time of Panini or even that of Patanjali, though both of them do note the "corruptions" that had crept even at the centre. Going further back to the time of Yāska and even further back to the writers of Pratisakhyas we find that they also note dialectical variations in the OI with reference to different areas. All this shows that the OI was changing right from 600 B.C. or even earlier, but the changes were not so great at the centre as to create distinct dialects, whereas in the outskirts the dialects had begun to develop. Among the dialects of the outskirts, the western (*i.e.*, that spoken in Saurastra) and the southern showed less changes than the eastern. This is why we find the earliest sanskrit grammarians noting the difference between Eastern and Western forms rather than between western and southern ones. The first reliable record however of the development of dialectical differences in the OI on regional basis is supplied by the famous edicts of Aśoka (about 250 B.C.). But we know that about three centuries before Aśoka, Lord Buddha (500 B.C.) and Mahavira about 25 years earlier had thought their doctrines in their mother tongues, as OI was not understood by the ordinary people of Bihar and Orissa. That this form of language which we may call Old Magadhi in absence of any other better name, must have existed at least two centuries before the Buddha is easy to understand. We can therefore say with confidence that the eastern form called the Old Magadhi had come into existence as early as 700 B. C. But we have not sufficient means to know exactly what kind of language it was, because Buddhism very soon became an inter-provincial and, after sometime, an international religion. The Buddhistic monks who travelled in different western provinces of India preached their religion in the various western local dialects in accordance with the instructions of their Lord. The original dialect was thus soon eclipsed by the western forms. But it appears that between 600 B.C. and 200 B.C. the eastern form of language had much political and religious importance and was understood all over India, as it was the religious language of the two great reforming religions, and the political language of the great Aśoka. The famous edicts of Aśoka,

to which we shall revert after some time, are said to have been first drafted in the eastern language and were then published in different parts of India after making only those changes in the original which would enable the people of distant provinces to understand them without much difficulty. After Aśoka the centre of politics, culture and religion again shifted to the west, and when it was time to collect, edit and put into writing the teachings of the two masters, a western literary form of language had to be selected for the purpose in order that it may be understood all over the Aryan India. This language was Pali, in case of Buddhism and Ardhamagadhi, in case of Jainism. That Aśoka knew the religious teachings of Buddha in an eastern form of language different from Pali is proved by one of his own inscriptions.

14. *The Aśokan Edicts :*

We shall now revert to the Aśokan edicts : We shall confine our remarks to the Western, Northern, Southern and Central edicts only, as the eastern ones which present quite a different form of language are not likely to help us in our treatment of Gujarati. The edicts at Shahbazgadhi and Mansera show purer forms of language than those at Dhauli and Jaugaḍa. The edict of Girnar which is more useful for our purpose shows a purer form of language very similar to that found at Shahbazgadhi and Kalsi, and widely differing from Dhauli and Jaugaḍa. The difference between Girnar and Sopara fragment is not so great as would entitle us to count their forms of language as two different dialects. The difference between the eastern and the western forms is observable in the following : (1) West r = East l : Gir. rājā, Dhauli lājā ; (2) the OI vowel -ṛ- > -a-in the west and -i-in the east : OI mṛgaḥ = Gir. mago, North-west mrugo, East mige ; (3) Skt -kṣ- = West -chh- and East -kh- : OI vṛkṣāḥ = Gir. vachā, OI kṣudraka = Gir chhudaka ; but East lukhāni, khudaka. (4) The west nom. sg. m. ends in -0, the East in -e, Gir. mago, East mage, etc. The difference between Sopara and Shah is not so great. The northern dialects show more conservatism by preserving conjuncts and retaining uncontracted forms for a longer time than Gir. and Sop : thus, north, dhramo, Gir. dhaṃmo; north mrugo, Gir. mago ; north priyasa, Gir. piyasa ; north majura, Gir. mora. Between Gir. and Sop., the latter, being farther from the centre shows more changes : thus, the use of cerebrals in Sop. for the dentals in Gir. and OI : as OI prativiḍhāno, Sop. paṭiviḍhāne, but Gir. pativiḍhāno ; the difference in vocabulary : Gir thairānam but Sop. vuḍhānaṃ (with cerebral for the OI dental -dh-) ; the OI -hm- = Gir -ṃh- without shortening the preceding vowel, but sop. -mbh- with the compensatory shortening : Gir. bāṃhaṇa, Sop. baṃbha (ṇa). The Sop shortens the long vowel before a conjunct, but not the Gir : bāṃhaṇa, etc. ; OI n > ṇ Gir, but > n in Sop : OI darśana- Gir dasaṇa, Sop. dasane ; Gir. hiraṃṇa, Sop. hiraṃna. Retension of the conjunct -st- in Gir. and changing it to double stop in Sop : Gir. dhaṃmanusasti, Sop dhaṃmānusaṭhi ; contractions in Sop : Gir. bhavati, Sop. hoti ; OI -jn- > Gir -ñ-, Sop. -jin:- : Gir raño, Sop. rājino. The changes noted above formed the bases for the further development of the Sop. dialect into Konkaṇi and Maharaṣṭri. The literary Pali being a standardized language shows a mixture of many idioms and dialects, but about a western dialect being its basis there is now no doubt.

15. *Three phases in the Middle Indian :*

The Middle Indian stage had 3 phases : (1) the *earlier, i.e.* between 700 B.C. to 200 B.C. The Old Magadhi, the Old Ardha Magadhi, the dialects of Aśokan edicts, and the earliest portions of Pali found in the Buddhistic Gathas, and a small portion of tipitaka represent this stage. The Ardha Magadhi of the Sacred Books of the Jainas does not represent this stage. It must be placed in the second stage from linguistic point of view. (ii) Then come the *Middle Middle Indian Stage,* lasting from about 200 B.C. to 600 A.D. The *prākrits* of the inscriptions later than Aśoka, the library *prakrits* of the Sans. Drama, the *prākrits* embodied in the Grammar books of Vararuchi, Hemachandra and others represent this stage : (iii) The last stage, the Apabhraṃśa stage was probably of a short duration lasting between 600 A.D.-1000 A.D.

16. *Changes Special to the EMI Stage :*

We shall now treat in historical order the changes which the OI underwent while passing through the three successive MI stages :

The Pali or the *Early Middle Indian Stage. The vowel changes :* (i) Long vowels became short before conjunct consonants and short vowels before certain groups of consonant became long : OI jīrṇa, EMI jiṇṇa ; OI simha-, EMI sīha. (ii) Contractions : OI -ai-, -au-> : EMI -e-, -o- : OI vaihāyasa, pa. vehāsa ; OI pautra, pa, potta. (iii) OI -aya-, -ava-> EMI -e-, -o- : OI jayati EMI jeti ; OI avarodha, EMI orodha. (iv) Contractions of -āya-, -āva-, -avā into ā ; and of -ayi , -āvi-, -ayi-, -āvi- to -e- : OI kātyāyana, EMI kaccāna ; OI Maudgalyā-yana, EMI moggallāna. (vi) the Samprasāraṇa, *i.e.* ya> i and -va- to u : OI s'van-, EMI suna-, etc. (vi) OI -rt-> -ṭṭ-.

Consonantal Changes : Consonants in contact : (i) h+a nazel, y, u, > the nazel y or u+ h : thus, hṇ, hn, hm, hy, hu become ṇh, nh, mh, yh, uh : OI cihna, EMI cinha ; OI jihvā, EMI jivhā, etc. (ii) A sibilant + a nazel cons > the nazel cons. + h : thus śn > ñh, śm > mh, ṣn > ṇh- ṣm > mh, sn < nh, sm > mh, etc. OI praśna, EMI paṇhā ; OI uśna-, EMI uṇha ; OI snā-, EMI nhā-, etc. (iii) mute + mute > double mute of the latter class : OI mudga, EMI mugga ; — sibilant + mute > aspirated mute double : OI niṣka, EMI nikkha, etc.—nazel + nazel > double the latter : OI nimna-, EMI ninna-, etc. (iv) Mute + nazel > double the first : OI udvigna, EMI ubbigga- :—mute + liquid > double the first : OI takra, EMI takka-.—mute + semivowel > double the first : OI sakya, EMI sakka. Only -ty- >-cc- as in kaccāna noted above.—Sibilant + Semivowel > double sibilant : OI miśra > EMI missa OI asya, EMI assa ; OI ramya-, EMI ramma-. etc. (v) Dental + y > palatal : OI satya-, EMI sacca- ; OI rathyā, EMI racchā. kṣ- > kkh and cch is noted in connection with the Aśokan. (vi) The final single or double consonants were lost.

Besides, there were many *sporadic changes* which become regular features with the pkt. or the Middle Indian Stage.

17. *Changes in the MMI Stage :*

The Prākrit or the Middle Middle-Indian Stage : Vowels : (i) Confusion in vowels : A confusion not only in the quantity but also in the quality of vowels is a marked feature of this stage. -a- replaced by i, e ; i by e ; u by o, and so on. (ii) Some initial single vowels dropped away : OI udaka, pkt. daga ; OI agāra, pkt. gāra, OI idānim, pkt. dāṇim, etc. (iii) Some syllables were altogether lost : OI astamayana- pkt. āttthamaṇa- ; OI nūnam, pkt. ṇam ; (iv) Contractions of similar vowels brought together by the dropping of the intervocalic consonant : ă̆ + ă̆ > ā ; ĭ̆ + ĭ̆ > ī ; ŭ̆ + ŭ̆ > ū This happened in long words.

Consonantal Changes : (v) Intervocalic -k-, -g-, -c-, -j-, -t-, -d- were dropped : OI udaka- pkt. uaa ; OI gaja-, pkt. gaa- ; OI rajata, pkt. raaa. So also (vi) -p-, -b-, -v-, -y- dialectically dropped intervocalically. OI pāpa, pkt. pāa ; OI hṛdaya, pkt. hiaa ; OI jīva, pkt. jia, etc. (vii) -kh-, -gh-, -th-, -dh-, -ph-, -bh- > -h- intervocalically. OI nuukha-, pkt. muka ; OI jaghana, pkt. jahaṇa- ; OI katha, pkt. kahā ; OI nabhas pkt. naho, etc. (vii) -ṭ-, -ṭh- > -d-, -ḍh-, intervocalically : OI kutumba- pkt. kuḍuṃba ; OI pīṭha-, pkt. pīḍha-. (viii) -ph- > -bh- or -h- dialectically : OI śephalika, pkt. sebhālia ; OI saphala-, pkt. sahala, etc. (ix) -b- > ziro or -v- intervocalically and dialectically. OI kabandha-, pkt. kavandha-. (x) Gutterals became palatals under the influence a palatal vowel : OI tiṣṭha- pkt. ciṭṭha-. (xi) Dentals were replaced by cerebrals in many cases dialectically or otherwise : OI na, pkt. ṇa ; OI daṃśa, pkt. ḍaṃsa ; OI niṣadha, pkt. nisaḍha, etc. (xii) Sibilants were all changed either to ś or to s dialectically. OI eṣaḥ, pkt eso, eśo, etc. (xiii) ḍ and l interchanged dialectically. (xiv) -ṇ- and -l- were confused. (xv) -ḍ- and -r- were confused (xvi) Consonant groups were further simplified into double ones.

18. *Changes in the Apabhrṃṣa or the Late Middle Indian :* This short stage marks the transition of the MI into the Mod I languages. Many phonetic changes did not occur during this stage in the body of the word; but the end of the word, terminations in particular, underwent so many changes that they undermined the whole OI structure of declinations and conjugations by bringing about confusion in the various forms of words. It became difficult to say from the mere form of a word, which particular grammatical role it was likely to play. This confusion paved the way for the analytical method of showing case and other relations which become such an outstanding feature of the Mod I languages. Phonetic changes : (i) the Final -o and -e > -u and -i. Thus the pkt. nom. forms like hattho and Loc. forms like hatthe became Apbh. hatthu and hatthi respectively. The verbal -pres. 1st pers. pl. like pkt. ṇamāmo became ṇamāmu, etc. (ii) The inst. sg. pkt. -ena became -eṃ. ; thus pkt. hatthena became Apbh. hattheṃ or even hatthiṃ. (iii) The pkt. -s- became -h- in gen. and loc. pl. : thus pkt. hatthassa and hatthesuṃ became Apbh. hatthahaṃ and hatthe-huṃ. (iv) The near denominative pronoun ā came into existence as distinct from -e- the remote denominative. (v) Pres. 1st pers. sing. ended in -uṃ and pl. in -huṃ thus bringing the MI forms very near the Mod I forms in -uṃ. Same is the case with the 2nd and 3rd persons. (vi) Even loan-words from Skt. voiced their unvoiced intervocalic stops ; that is. -k- > -g- ; -kh- > -gh- ; -t- > -d- ; -th-

> -dh-; -p- > -b-; and -ph- > -bh-: Skt. kāka- > Ap. (lw) kāgu; Skt. sukha- > Ap. (lw.) sugha-, etc.

19. *Morphological Losses in the MI Stage:*

Above were the principle phonetic changes that came into existence in the MI Stage. A few more will be treated under the discussion on the development of the MI dialects. In the meantime we shall hurriedly glance at the morphological losses and changes throughout the MI Stage. We know how complicated the paradigms and conjugations were in OI with the various nominal and verbal types and classes. We also know how rich the OI verb was in tenses, moods, participles, derivatives, etc. All this exhuberance of the OI was drastically cut down into bare simplicity. In nouns, the consonantal types and the verb-nouns with different stems for strong and weak terminations, were viped out all together or transferred to the vowel-ending types. In the vowel-ending nouns also, the less frequent types disappeared and were replaced by the more common ones. Only the following types in Nouns remained alive in the MI stage: (1) mas. and n. nouns in -a: putto m; vaṇaṃ n. (2) Fem. in -ā: mātā. (3) Mas. and nut. and f. nouns in -i, -ī and -u, -ū: aggī m., vāu m., dahi n., mahu n., naī f. (4) The mutilated type in -ṛ of nouns showing family relations, etc.: bhattu m. piā m. Only the sporadic forms of stems in -au, -o, -ai, -e and in -n, -s, were retained.

20. *Losses in Verbal forms:*

Coming to verbs, the MI lost the various OI temporal and model stems and also a large number of terminations. The augmented types, the reduplicated forms, the Intensives, the Desideratives and all such complicated formations were lost. Only the following conjugations remained:

(i) The present indicative of the parasmai pada: vāṭṭāmi, vattāmo, etc. The first conjugation of the Indicative present being more powerful in the OI numerically, was generalized for all the roots of the second conjugation and also for those of the first in which the stem was made by the suffix -ya-. A few sporadic forms of the present second conjugation however remained alive. The Indicative pres. Atmanepada survived only in the 3rd pers. sg. and pl. and in rare cases in the first and 2nd pers. sings. only. (ii) Of the moods, the optative survived in the present system but the Indicative terminations were added to the optative stem in many cases: thus, vaṭṭejjā or vaṭṭejjāni or vaṭṭeam were the typical forms. (iii) The Imperative for the 2nd and 3rd persons present also survived with forms like: vaṭṭa, vaṭṭasu for 2nd sg. and vaṭṭaha, vaṭṭadha, vaṭṭahu for the pl., etc. (iv) Of the two futures only the first, with -sya- or -iṣya- survived. (v) The passive stem in -ya- survived in various forms (*a*) in -yya- (b) -jja-, (*c*) -īya- (*d*) -iyya- (*e*) -īa. (vi) The causative survived in the form -e- and -ve- from skt -aya- and -paya-. A fresh causative in -āḍa was just created and used in the words like bhamāḍai, tamāḍai.

21. *MI losses in Participles :*

Coming to the participles, their large variety in the OI was replaced by a few but important forms which were retained : (i) The Parsm. pres. part. in -ant ended in -anta in MI. Its feminine was -anti : hasaṃto m. hasaṃtam n. hasaṃtī f. (ii) The Atm. pres. part. was in -māna and -āna : adamāṇo m., adamānam n. vihammāṇo or vihammāmaṇo for OI vihanyamānas. The f. was formed by adding -ī : ahare-mānī ejjamānī -o, etc. (iii) The perfect passive participle in -ta or -ita has survived in the form -ia or io m. -iaṃ n. -ī, f. duhia, jāṇia- bhaṇjia, etc. Coming in contact with the final radical vowel in a-thematic forms it created several sub-types : s + ta > ṭṭha ; p + ta > -tta ; g + dh > -ddha, etc. Many sporadic form of these varieties have been inherited by the Mod.I from the MI. The perf. part. pass. in -na has sur-vived in a few stray cases. The active form of this participle arrived at by adding -van has survived in very few cases. (iv) The potential participle in -tavya has re-mained in the MI as -avva-, -evva- and was even extended to -evvaum, -ivvaum in the Apabh although the extension of participles and adjectives is a regular feature with the Mod.I only. The other in -aṇīa-, -aṇijja from Skt. -anīya-, and in -a from skt. -ya has survived in only stray cases. (v) The infinitive in -tum has assumed the form -um in the MI kāum ; dialectically it appears also as -dum : mari-dum. A few forms in -tu -maṇā or u-manā similar to Skt. tu-manā has survived in the MI : *e.g.* jāṇiumaṇā. Other forms in -ttae or -ittae are derivable to Vedic -tave, -tavai, etc. The Apbh. has -aṇa, -aṇahaṃ-, aṇahiṃ which latter two are the Gen. pl. and loc. sg. forms of -ana, the nominal suffix in OI. It has also the forms in -evaṃ -evi, -eppi, -eppiṇu, -aṇaṃ, -auṃ, and -evvauṃ ; -evaṃ comes analogically from the type devaṃ —OI dātum ; -vaṃ and forms with -vu- come from -vana-, Vedic -vane ; the forms with -pp are arrived at by contamination with the Absolutive in -tva-. (vi) The absolutive in OI -tvā and -ya are inherited in the MI in many forms : (*a*) -ttā : vanditta, (*b*) -ttaṇam from Vedic -tuāṇam : bhavittaṇam. (*c*) tuāṇaṃ from *tu-ānam (Vedic.), ghettuāṇaṃ, bhottuāṇa. (*d*) as also -tuṇaṃ, -uṇaṃ, -dūṇaṃ, '-tuṇa : ācchiūṇa, pevesiūṇa, kādūṇa, gahidūṇa, āgantūṇa, etc. (*e*) -cca- : MI peccā—OI pretya, MI thiccā—OI sthitvā. -jjhā : MI bujjhā—OI buddhuāj ; -ss- ; pavissa. (*f*) Apbh. had an absolutive in -tuī and tuīnaṃ from the OI type iṣtuīnam, pituī-naṃ which have become -ppiṇu : Apbh. gameppiṇu ; —piṇu : gampiṇu ; -viṇu : chaḍ-devīna ; -ppi : gameppi ; -vi, game-vi, pekkhevi, pekkhivi, mellivi, cumbivi, vicho-divi, bhaṇivi, karevi, ramevi. (*g*) Apbh. -ia—OI -īya or -īya : pāḍia, aṇuṇia, lahia : (*h*) The Ardh. māgh. inf. in āe is to be traced from types like the OI ādāya, utthā-yagate. (i) The Apbh. -i is from the OI -ya=pkt. -ia with the final a fallen off. Apbh. parihari, pasari, bhai, cali, vali, kori, ṭhavi, suṇi—MI pariharia, pasaria, bavia, calia, valia, karia, vicaria, ṭhava, suṇia.

22. *MI losses in Phonemes :*

The MI lost the following OI phonemes altogether without creating any new ones : The vowels lost : r̥, r̥̄, l̥, ai̯, au̯ ; consonants lost : n, ṣ altogether and ś and s dialectically, l̥, l̥h (these two existed in Pali but were subsequently lost). Other sounds lost : visarjanīya, jihvāmūlīya and upadhmānīyā. All the losses described

above and many more made the MI a worn and torn set of dialects abounding in confusing forms, inadequate morphology and monotonous and restricted linguistic sounds. Their reconstruction on a large scale and on entirely new lines was absolutely necessary for its surival as a serviceable linguistic medium. This mighty work was destined to be achieved by the speakers of the great Modern Indian Languages.

23. *The Substratum Language :*

But before we come to that question, it is necessary to have a bird's-eye view of the substratum on which the Indo-Aryan was imposed during its life and spread in the various parts of India. It is now proved beyond doubt that different tribes, non-Aryan or Aboriginal as they are sometimes called, had occupied the whole of India before the Aryans entered it from the North-West. When, after entering India and during the long process of expansion and settlements the Aryans came in contact with the aboriginal tribes, their relations were not always cordial. They had fights and quarrels in which Aryans were not always victorious and very often they had to compromise their attitude towards the non-Aryans by marrying girls from these tribes. The civilization of these tribes was well-advanced and, perhaps, had gone further in some respects than that of the Aryans. The excavations at Manjo-daro and Harappa have proved this beyond doubt. The aboriginals knew how to build cities and to fortify them ; they knew the use of metals, wood, earth and many other articles of civilisation. They were also well-advanced in arts and sciences. But they were not, perhaps, as compact as the Aryans ; they were divided into various tribes and gangs, and were probably often at war among themselves. They, probably, lacked the strong and highly centralised patriarchical family organisation which was a strong feature with the Aryans, and they were not as quick, strong and active as the Aryans on account of their long stay in the hot portions of India. The Aryans used the swift vehicle of war, the horse, which these tribes wanted. Whatever might be the reasons, the Aryan invaders succeeded in the long run in establishing their superiority over the aborigins in 3 spheres : the political, the social and the linguistic. As a result of compromise just as the Aryans had to give certain concessions to the aborigins in social and political fields, in the same way they had to borrow consciously or unconsciously, various linguistic factors from them. We find references as early as the Brahamana period, according to which Vretyas were taken up in the Aryan fold, and political status of the mlecchas had to be recognized. The same thing no doubt happened in the linguistic sphere.

24. *The Munda Languages :*

Let us cast a glance at the languages of these aboriginal tribes. There were probably two tribes in India at that time : (i) The Austric-tribe called the Mundas and (ii) the Dravidians. It is believed that the Munda tribes which are scattered over a very large part of the world today were the earlier occupants of India and they were driven out partially, and conquered by the Dravidians who came later. Or both may be existing together in India from pre-historic time ; and later on the Dravidians must have scored over the Mundas. The Mundas had not much of civili-

zation and their language has, perhaps, not played an important role in the development of the OI. When the Aryans came , they were still existing in large numbers in the Himalaya mountains and in the extreme north and east of India. They are identified with the so-called paiśāca tribes of the Himalayas on the basis the language they spoke. Following were the characteristics of the Munda dialects in India: (*a*) Aggultination of the verb was a very prominent feature with these languages. The verb 'dal' to strike was aggultinated to 'dal-ocho-akan-tahen-tae-tiñ-a-e' meaning ' he who belongs to him who belongs to me will continue letting himself to be struck.' (*b*) There was a glottal stop at the end of a large number of Munḍa words (*c*) These languages distinguished gender on the basis of animate and inanimate things, and not on the basis of sex as in IE languages. (*d*) They had 3 numbers: the singular, the dual and the plural like the OI. (*e*) There were 2 separate forms for the dual in the first person, the one to exclude and the other to include the person addressed. Some was the case with the 1st pers. pl. (*f*) There existed the method of adding suffixes and infixes to the verbs. (*g*) These languages had a categorical 'a' to make a statement. Anything spoken about a person in any number of words would be incapable of being understood as a statement if it was not followed by this categorical ' a.' We can see at a glance from these characteristics that some, namely (*d*) and (*f*) above existed in the OI also, while others did not. When the Aryans entered India, languages with the above characteristics were spoken all over India, especially in North India. The Linguistic Survey has revealed the existence even to the present day of many linguistic "islands" of Munda languages in North India. Some of the most remarkable Munda " islands " are given here : Nanwari, Bunan, Rangloi, Manchāt in Śimla Hill States and round about ; Rangkas, Darmiya, Byangsi and Chandangsi in the mountains north of Gadhawal ; Khambu, Vyākhā, Vāyu in Nepal ; Dhawal in Darjeeling ; the big Khasi group in the Khasi Hills, a large compact area of Mundāri in Orissa and two somewhat small but very important " islands" of Munḍari in Central Provinces south of the Narbudda and in Madras near Ganjam. There is also a large patch of Mon languages from Rangoon to Amhurst in Burma. These languages are conspicuously absent in India South of the Central Provinces. On the basis of these data we are justified in assuming that Munḍa languages once existed in the whole of North India extending from the Punjab to Burma and as far as the Central Provinces to the South. It is noteworthy, however, that the whole of the N. W. Frontier Provinces, the Punjab, Rajputana, Sind, Gujarat and the country from Delhi to Benares covering to the South, Gwalior, Jhansi and Jubbulpore,—or to speak roughly, the Madhydesha and linguistic areas directly connected with the central or Madhyadesha language have no such " islands." Their absence in this part of India can be explained on the assumption that the Aryan linguistic force was strongest here at the centre than it was in the outlying districts ; and it was consequently successful in eradicating all the groups of Munda languages from that area without leaving a single language " island " in this area.

25. *The Interaction of the Munda and the Dravidian Languages :*

Coming to the Dravidian group of languages, we find the same phenomenon. The Linguistic Survey has revealed a big Dravidian patch of the Brahui group in Baluchistan while some small, but, all the same, more important, ones in Central Pro-

vinces, Bihar and Orissa. They are the various forms of Gondi dialects in Bhopal, Nagpur, Wardha, Balaghat, Chana, Sambalpur and Raigadh. A small patch of Matto in Upper Bihar is also significant. Besides the above patches, the great Tamil, Telugu, Kanarese and Malayalam areas covering the whole of India South of Goa are too well-known to be mentioned. These islands like the Munda islands are absent in the Madhyadesha, Rajputana, Gujarat and Sind. If the finds of Mohanjo-daro and Harappa prove to be the representatives of the Dravidian civilization—an opinion to which modern research is more and more inclined, there is little difficulty in assuming that the Dravidians on the strength of their superior civilization and culture defeated and partially at least drove away the semi-barbarian Mundas in the hills of the Himalayas, Vindhya and Khāsi, and into the outlying districts of India such as Orissa, Bihar, Burma, etc. The problem, then, seems to have been reduced to the following terms : when the Aryans entered India, the language which they brought with them had to face the Dravidian languages in the main and also some forms of Munda languages which perhaps had survived the overpowering influence of the former, but if existing at all at that time, with some vitality, they were fast dying out from almost the whole of India, excepting the parts noted above. As it is clear from what is said above that the Dravidian group had to bear the main brunt of facing the Aryan speech in India, it will be very instructive if we give below, some of the main characteristics of these languages.

26. *Features of Dravidian Languages :*

The Dravidian languages are (*a*) poly-syllabic as opposed to the mono-syllabic ones of China, for which we shall have to say a few words later on. (*b*) They belong to the aggultinative group. The process of agglutination is illustrated above in the treatment of the Munda languages. (*c*) In this group, inanimate and irrational nouns have the neuter gender. (*d*) The difference in gender is shown by suffixing a separate well-known word in which the gender-idea is prominent. (*e*) The Dravidian nouns phrase themselves with post-positions. (*f*) The Dravidian adjectives are indeclinable *i.e.* they do not change gender and number in hermaony with the nouns they qualify. (*g*) The Dr. languages make a free use of participles for adjectives.: (*h*) They possess the Inclusive and the Exclusive 1st pers. pl. pronominal forms. (*g*) The Dravidian group has no separate form for the passive, which they make analitically by using a verb meaning ' to suffer.' (*h*) These languages have a great partiality for using participles for the actual full-fledged verbal tense-and-mood-forms of Conjugation. (*i*) They use some relative participle nouns in places where the Aryan languages use relative pronouns.

27. *Tibeto-Burman Languages :*

Besides the Munda and Dravidian languages, there was probably one more group of languages current in India at the time of the Aryan immigration. They were the Tibeto-Burman and Tibeto-Chinese languages. Even if their existence in India as early as about 1000 B.C. can be proved, they were mostly confined to the East ; and the Saurastra and the neighbouring Western Coast of India (modern Gujarat) with which we are concerned here more particularly was practically unaffected by them. That there was communication between the Eastern parts of India and Tibet, China

and Burma, is very easy to understand, for otherwise Buddhism which started in the 6th century B.C. cannot so easily and so soon become an international religion spreading in China, Tibet and Burma, in some cases, even earlier than it spread in other parts of India itself. We give below, therefore, some of the most important features of the languages of the Tibeto-Burman group: (i) Words are mono-syllabic. (ii) Modifications in meanings expressed by full words are brought about by adding fresh words, called empty words which express grammatical relations. (iii) Tone is a grammatical category, *i.e.*, different tones given to the same word alter its meaning. (iv) There is a frequent use of the glottal stop. (v) There exist unexploded stops at the end of words, and (vi) the great importance of ' order of words ' as a powerful category of grammar. Of these characteristics, Nos. (iv) and (vi) are common to Munḍa languages.

The Linguistic Position at the Time of the Aryan Conquest :

In short, following was the final linguistic position of India, when the Aryans entered it. There were the Dravidian languages in full play in the whole of India ; they had practically superseded the earlier Munḍa languages which in their turn had occupied the whole of India prior to the coming of the Dravidian languages. The Munḍa languages were not completely overlaid by the Dravidian ones when the Aryans came in, but their strength had diminished, as they were decaying. In the east, *i.e.*, in modern Assam, Bengal, Orissa and probably also in Bihar, languages of Tibeto-Burman and Tibeto-Chinese groups had great influence, if they were not actually spoken there. The Aryan language had, therefore, to face the Dravidian languages in their most powerful form and the Munḍa ones in a decaying stage in the North, South and West parts of India. In the East, it had to face the influence of the Tibeto-Burman and Tibeto-Chinese groups in addition to the Dravidian and Munḍa languages.

28. *The Development of Dialects in the MI : the East Secedes first :*

Keeping in mind this substratum, we shall now revert to the question of the distribution of MI dialects.

The OI had begun to change as soon as the Aryans came into India. In the ṛgveda, which embodies the literary form of the oldest Indo-Aryan speech, we already find a mixture of new words with the old. In the later Saṃhitus and the Brahmanas, the number of new forms of words became large. Wrong pronunciations based on the corrupt forms of words and confusion in accent, we are told, have brought about the defeat for the Asuras and victory for the Devas. The Asuras are described as being entirely unable to speak the correct sacred Aryan language, and were consequently misunderstood by gods. In the Pratiśākhyas, are noted with meticulous care differences in pronunciations of the various schools of Vedic recitation: Many of these differences can be explained only on the assumption that the ṛsis of different places and different sakhas spoke the forms of OI language which phonetically differred from one another in many respects. Coming to Yāska,

the author of Nirukta, we find for the first time a clear mention of the development of dialects on regional basis, which differred from one another not only in phonetics but also in vocabulary. The OI of the ṛgveda had become sufficiently unintelligible even to the learned and a controversy had already started in which one party held with seriousness and vehemence that Vedas had no meaning whatsoever. Yāska divides the words into two classes, the Vedic and the Bhāṣika (*i.e.* of ordinary speech). Thus the later stage of the OI, called the Saṃskṛta stage, was fully established. He also talks of the differences in the languages of the Easterners and the Westerners. But they are not so great as to justify us in saying that two distinct and mutually un-understandable dialects had come into existence. So long as the Aryans confined themselves to Brahmāvarta, Kurupañcāla, and Madhyadeśa, their language did not change fast. But drastic and rapid changes started when migrations to the East and the South were made. Paṇini, Kātyāyana and Patanjali have so many references in their works which tell us about the corruption and development of the OI into dialects that we are almost compelled to accept dialectical difference even in the West at about 300 B.C.

Coming to the east the case was quite different. The OI spreading, like waves, was actually being modified and getting feebler and feebler during the very course of its advancement, and the changes were greatest at the easternmost end where its force was practically completely exhausted. The dialectical variations, therefore, developed earlier and more marked by in the East, say, as early as 700 B.C. when in the West a more or less uniform language was still spoken. Thus the OI was first split up into two large groups, the eastern or the *Prācya* and the Western or the *Pratīcya groups.* The preference of Buddha and Mahavira (6th century B.C.) for the local vernaculars as the medium of their teachings, the establishment of the Eastern language as the court language of Aśoka (3rd Century) and the classification by the earliest Prakrit Grammarians of the Prakrit into the Eastern, the Western, the Central and the Paiśācu groups (Vararuchi 200 A.D.) can be easily explained on the basis of this division.

The first stage of the development of the MI is characterised by many changes which were common to the whole Indo-Aryan area. They consisted of the various degrees of progressive and regressive assimilation of consonantal groups occurring initially or intervoccally: thus, (*a*) a stop of one class + a stop of another class > the double stop of the latter class: *e.g.* O.I. -pt- > MI-tt-, OI -bd- > MI -dd-; (*b*) a sibilant + a nazel > the nazel + h: OI -sn- > MI --nh-; OI, etc. Contractions like (*c*) OI -aya- or- ai- > MI -e-; OI -au- > MI -o-; OI -ava- > MI -o-. But some special changes also developed dialectically in the east: (i) the OI ṛ > MI -a- in the West and to -i- in the East. (ii) The sounds -r- and -l- which had dialectical treatment in the pre-Indo-Aryan stage became once again a source of further dialectical differences. The -t- was more common in the East than in the West. (iii) The 3 sibilants were reduced to s in the West and ś in the East. In grammar the nom. sg. m. form of nouns in -a ended in -e in the east and in -o in the main language. The Atmanepada and forms of uncommon tenses and moods lingered longer in the West than in the East.

29. *The Himalayan Dialects secede next :*

Coming to the North or the Himalayan regions, the OI was fast changing as it came in contact with the hilly languages probably of the Munda family. The Mundas were aborigins who probably spoke decaying forms of their dialects in which unvoiced sounds predominated over the voiced ones, and which were characterised by absence of cerebrals in which the Dravidian languages were rich. They therefore changed the intervocalic -g-, -d-, -b-, etc. into -k-, -t-, -p-, etc. A few words in OI, probably loans, show unauthorised unvoiced dental stops where the original IE or IIr or OI has the voiced or cerebral sounds. The existence of these words in the Saṃhitās enables us to assume the existence of dialectical developments of the OI in the Himalaya regions as early as the Saṃhitā period. These hilly form of the OI are later on described by the Prakrit Grammarians as the Paisachi language. To sum up the above remarks, we can say that the *first stage of changes in the OI* was characterised by three well-marked groups or blocks of dialects : (*a*) The central or the main block, reaching as far as Sauraṣtra in the West, Surpāraka Avanti and probably Vidarbha in the South and covering the modern Rajputana, the Punjab, the N. W. F. Provinces and the Madhyadeśa (the last consisting of the ancient Brahmāvarta, Kurupāñchāla and Matsya). (*b*) The Eastern block covering, Magadha, Vanga and Kalinga (*i.e.* modern Bihar, Bengal and Orissa). The modern Eastern Hindi area consisting of Kāshi, Kosala and Vatsa was a connecting link to these two blocks . (*c*) The Himalayan or the Paiśachi block.

30. *The Southern Dialect secedes next fom the Centre* :

During the *second stage*, the division was verticle, *i.e.*, the Southern form was differentiated from the Centre. This stage is what is called the Prakrit stage. During this stage many common changes took place throughout the Indo-Aryan dialects, but there were some which were special for different areas and which were responsible for the further development and differentiation of the MI languages into the regional Prākrits. The Prākrit Grammarians give us a fair idea of the gwroth and multiplicity of these Prākrists. This stage must have started earlier than the 1st century B.C. in the outlying districts and about a couple of centuries later at the centre. The earliest grammarian of this stage is Vararuchi. He treats 4 Prākrits which he calls (i) the Prākarit proper treated in detail, (ii) the Paiśachi, (iii) the Māgadhi (iv) and the Śaurseni. He derives the Prākrit proper from Sanskrit and the remaining two from Śauraseni which also is said to be directly related to Sanskrit. At the end of his printed editions we find a set of sūtrās for Śauraseni not commented upon by Bhāmaha. These sūtrās are considered to be spurious by some ; but if we accept their view we have also to consider the sutrās X_2 and XI_2 in the sections on Paiśachi and Magadhi to be spurious. It is better therefore to take for granted the existence of 4 and not 3 Prākrits in Varamchi's time, of which the southern form had become a library language suitable for songs and poetry on account of its liquid sounds. Once this southern form was raised to the dignity of a literary language, it cast off many of its local characteristics and became extensively used throughout India. But a few specialities of the southern form still remained attached to it as did its name. Some of these peculiarities, *e.g.*, the in-

declinable participle in -ūna as different from the same in -īa or -īya in Śauraseni help us to associate this Prākrit even in its literary form, with modern Marathi. These grammarians it must be clearly understood were not writing grammars of real spoken languages but of literary Prākrits useful for dramatists who were required to put different Prākrits in the mouths of different types of low characters. As Madhyadeśa was the birth place of Indian drama and as Śauraseni was the spoken language of cultured women of the country at that time, the early dramatist had to see carefully that his Śauraseni was quite correct. Not so much care, however, was necessary for the other Prakrits as the audience of Madhyadeśa can hardly be expected to have detailed knowledge of the other Prākrits. The Dramatist therefore contented himself by writing the other Prakrits which were probably not as correct as Śauraseni, but which had their sufficient prominent characteristics to enable the audience to identify them with the respective, real, spoken Prākrits. We need not therefore expect detailed and scientific accounts of the spoken languages in these grammar books. But whatever we get from them is of much value to us in settling the regional distribution of the Prākrits. The grammarians later than Vararuchi increased the number of the Prakrits to five, six and even to sixteen; while the latest raised the number to 50. This fact broadly indicates that the spoken dialects were getting differenciated among themselves in the course of a few later centuries. But these later grammars are not so useful to us for the study of the actual state of things in spoken Prākrit, as many of them were written when even these Prakrits were dead literary languages. From Vararushi we can say with some degree of plausibility that the OI had split up during this period into (i) the Central or the Śauraseni block covering the old Brahmavarta, Kurupanchala, Matrya, Śaurasena, Avanti, Saurastra, Marudeśa and Śakadevipa or the area covered by our Punjab, West U.P., the country north of Narmada, Kathiawar, Sind and Rajputana; (ii) the Magadhi, area as stated before, with the Ardhamagadhi area covering from modern Benares to Sitapur in the North and Jubbulpore in South-west; (iii) the Mahārāstri area including Surpāraka and reaching upto Goa in the South and covering the old Vidarbha, Dakṣiṇāpathā and Vindhya, *i.e.*, covering modern Amaraoti and the country north of Godaveri; and of course (iv) the Paiśachi area described before.

31. *Special Changes of this Stage:*

Of the changes that took place during this stage the most important and common to all dialects were: (i) the loss of some intervocalic stops like -k-, -g-, -c-, -j-; (ii) the intervocalic -t- > -d-; (iii) the intervocalic -n- > -n-; (iv) some vowel contractions like ā+ā>ā; e+a>e; o+a>o; (v) the shortening of long vowels before the newly developed double consonants was made uniform. The differentiation was effected by the following changes: (i) *Western forms* were differentiated from the *Eastern forms* by their treatments of sibilant and nom. sg. m. forms, etc., as noted above; (ii) In the Western group, the central or *Saurasẹni* was differentiated from the *Southern* or *Mahārāstra* group in (*a*) latter's preponderance for cerebral sounds instead of dental ones as noted in connection with the Aśokan edict fragment of Sopara; (*b*) in dropping the intervocalic -d- and changing -th- and -dh-

to -h-. In the central dialects this decay was not complete, *i.e.*, -d- and -dh- were retained though in a feeble condition. In it the intervocalic -t- and -th- were changed to -d- and -dh- and not to zero as in the former. It is true that later on the intervocalic -t-, -th-, -d-, -dh- receive the same treatment in the central dialects. But on that ground Śauraseni and Maharāṣṭri should not be held to be identical because of the time factor. At a definite time when -t- and -d- were not heard in one, they were heard in the other language, and when -th- and -dh- were heard as -h- in one, they were heard as -dh- in the other. (*c*) The indeclinable participle was made by the suffix -ūṇa in Maha. and by -iya, -ia, -īa, etc., in the central group ; (*d*) the use of acch- 'to be' in the central and of as- in the Mahā. was another point of difference. (*e*) The existence of full neut. nom. acc. pl. forms in -āṇi in the central while that of -āṃi in Mahā. (iii) The Ardhamagadhi shared the characteristics of the eastern as well as the western dialects and that is why it differs from both. The language of Śakadvipa (modern Sind) and that of West Punjab (the modern Lahanda area) differed from the central language not very considerably. Perhaps the retension of -vv- in Sind and its change to -bb- at the centre may have been a point of differentiation at that time.

32. *The Lahanda-Punjabi and Sind Area secedes from the Centre :*

These dialects commonly called the Prākrit languages continued to be spoken during the Middle ages upto about 650 A.D. The last stage of the MI, called Apabhraṃśa, effected some further changes and was probably in common use till about 1000 A.D. when the earlier Modern Indian languages (of which Gujarati was one) began to be characterized. During the transition stage of Apabhraṃsa, the double consonants began to be rendered single with the compensatory lengthening of the preceding short vowels. This change was so far-reaching in consequences, that the MI assumed the form of ModI chiefly on account of it. The Punjabi escaped this change altogether, and the Lahonda and Sindhi areas did so partially, for they simplified the consonants but did not lengthen the vowel. Thus the OI hastas 'a hand' which became MI hattho was, in the beginning of the ModI languages, hattho in Old Punjabi ; hatho in Old Sindhi and Lahonda (*cp.* Mod. Lah. hath and Mod. Sindhi hathu) while in other languages it became hātho which gave, later on, the form hāth in G.H.B., etc. ; and hāt in Marw. M. and pahāṛi languages. Thus the Sindhi, Lahonda and Punjabi areas were cut off from the central group. This probably happened somewhere about 1000 A.D.

33. *Rajasthani-Gujarati Block Secedes from the Centre :*

About this time or somewhat later, another phonetic change was shaping itself on account of which the whole Rajasthani block, consisting of Mod. Marw., Mod. Mewaṭi, Mod. Jaipuri, Mod. Mewari, Mod. Malvi, Mod. Guj., and Mod. Khandeshi was separated from the central Mod. Hindi area, or as it is upto this time called, the Śaurasena area. The split worked as follows :—There was a large number of nouns in the MI which ended in -ao m- and -aaṃ n. on account of the OI a + an unaspirated stop + o and a + an unaspirated stop + am becoming -ao and -aaṃ. Of these groups -ao > ā in the central area and it became -au in the Rajasthani-Gujarati group. Even the Brij Bhāṣā shared the change -ao > -au with Raj.-Guj., but did not share

other changes. This change was heralded in the Apabhraṃśa stage where the final -o>-u. Moreover the nom. pl. OI -a+a stop+ās which became -aā in MI, now developed into -ā in the West but into -e at the centre. Thus the word ghoṭaka 'a horse' becomes nom. sg. ghoṛau in Brij., Mar., Mew., Mal., Guj., etc., but ghoṛā in West Hindi; also the pl. ghoṭakāḥ becomes ghoṛā in Mar., Mew., Mal., Guj., etc., and ghoṛe in West Hindi. This change had far-reaching consequences and affected even the grammar. The Raj.-Guj. block, therefore, had to secede, though last, from the central Hindi. This happened in about 1100 A.D. As our present inquiries are directed towards Gujarati we shall now concentrate on the Raj. block and not on the centre.

34. *Jaipuri secedes from the Guj-Marw-Malvi Block:*

It is true that upto the 14th century Gujarati and the various Rajasthani dialects were quite akin to one another. Even during the development of the analytical stage (from 1100 A.D. onwards) when post-positions came to be employed for different case relations, many of these dialects had post-positions, which were common to Old G. Thus OG nai (13th century) dative post.-pos. appears as nai and naiṃ in Mewaṭi, Marwari and Jaipuri and as ne in Guj. and Malvi. The WH has, in its stead, the one with ka- in it. The present continuous idiom which appears for the first time in Old G in the early 14th century is shared by the Raj. dialects. This idiom consists of the formula, the present tense verbal form + the present tense of the verb 'to be', *e.g.*, karaichai 'is doing.' The WH and its dialects have the pres. part. +the present tense of 'to be' as kartā hai. Among the Raj. dialects, Guj. has more affinity with the Malvi, Marwari and, strangely enough, with Jaipuri, though the last is separated from Gujarati by another dialect Mewari. For example, Malvi and Jaipuri distinguish, like Guj., the original v and b, while Mewaṭi and Marwari change them to b—an influence from the centre. Jaipuri and Mewari preserve the true future as does Gujarati. Jaipuri has chai for the verb 'to be' as in Guj., Malvi and Marwari have huṃ 'I' as in Guj. while the central dialects have mai, etc. But it appears that Jaipuri separated from the Guj.-Marw-Malvi block early in the 15th century. Thus the idiom of continuous past tense, *e.g.* Guj. cālto hətɔ, 'was waking' constructed on the formula present participle of the main verb +the pres. part. of 'to be' which is found to have been evolved early in the 15th century, *i.e.*, later than the continuous present, is shared by Malvi and Marwari along with Gujarati but not by Jaipuri which, along with WH, has a different method. Thus we see that Guj., Mal. and Marw. were a uniform block till about the 15th century.

35. *Marwari and Malvi secede from Guj.:*

The final separation of Guj. from these two Raj. languages came when the latter two lost their neuter gender and Guj. preserved it. As a consequence the two Raj. dialects had to transfer many neuter nouns to mas. and some to fem. Some distinct post-positions were then adopted by each. Finally the connection between Guj. on the one hand and the two Raj. dialects on the other became less frequent as time went. The Raj. languages turned again to the centre and resumed relations with it,

on account of political relations. They therefore developed the remaining new paradigms like the periphrastic future 'calũgā,' etc., under the influence of WH.

36. *Relations of Bhili Dialects with Guj.:*

The existence of Bhili dialects on the borderland between Guj. on the one hand and Marwari, Malvi and Mewari on the other hand and their very close connection with all the above languages prove the compactness and solidarity of the Western block of speeches which may be called the Guj-Bhili-Rajasthani Block. But Bhili is more related to Guj. than to Mar., Mew. or Mal., because the Bhils remained in closer touch with the people of Guj. as history tells us than, with those of Rajasthan in 14th, 15th and 16th centuries. As a matter of fact, the Bhili languages are nothing more than the dialects of Gujarati.

Here perhaps it will be better if we put in a nutshell the whole process of differentiation and characterization of Guj. The IE (2500 B.C.) had a branch called the Aryan which travelling through Asia Minor, Mesopotamia and Persia split up (1500 B.C.) into Iranian and Indo-Aryan sub-branches. The Indo-Aryan in the form of the OI became a big and powerful independent source of further linguistic development in India. The earlier stage of the OI, Ṛgveda, (1200 B.C.) is called the Primitive OI and the later one, of the Brahmaṇas, etc., is called the later OI. This OI branched itself into the Eastern and the Western (700 B.C.) dialects. The Western form again split up into 3 sub-branches (between 200 B.C. and 200 A.D.) as (*a*) the Hilly or the Paiśachi Branch, (*b*) the Central or the Saurasena branch and (*c*) the Southern or the Vidarbha or the Maharaṣṭra branch. It was during this time that the Ardhamagadhi form in Oudh, Kaśi, etc., was being differentiated from the Eastern as well as from the Western groups. A further slice of area covering the Mod. Sindhi, Punjabi, and Lahonda was cut off (between 800-1000 A.D.) from the central block which now consisted only of the Madhyadesha, Rajasthan, Gujarat (including Saurashtra) and the country north of Vindhya ranges. This block further split up into the Guj.-Raj. area on the one hand and the Śaurasena area on the other at about 900-1100 A.D. The Guj-Raj. block was the last to secede from the centre. From the Guj-Raj block, Jaipuri was separated in the 14th century and the remaining Guj-Mar-Mal. group finally split up into Guj. on the one hand and Mar. and Mal. on the other in the 15th century. After this split the Rajasthani dialects resumed their relations with the centre on political grounds, while Guj. continued to develop independently. The Bhils maintained more relations with Gujerat and for a longer period than with Rajasthan; their language is, therefore, so similar to Guj. that linguistically it can be classed as a dialect of Guj. In the Raj.-Guj. block, the Guj. area was probably the centre of linguistic tradition corresponding to the Madhyadeśa in the central block, as it has preserved the linguistic traditions more faithfully than any other language of Rajasthan.

37. *Old Gujarati. The name OWR is unwarranted:*

We shall now resume the thread of our narrative of the development of Gujarati which had reached as far as the last stage of the MI called the Apabhraṃsa. Immediately from the Apabhraṃśa, Old Gujarati was born in the 11th century. We

have prose MS evidence reaching as far as the 12th century in which OG appears as a fairly developed and well-established idiom. It is true that many post-positions, compound tenses and composite verbs which are the characteristic features of MG are not found here, but a beginning is already made. The post-positions OG māhi̊ > Mod.G -mā̊, OG taṇau > Mod.G. nau, nɔ, OG siuṃ > Mod.G. śū̊ are already there. The ablative post-position has not yet developed, nor the dative. Of the compound tenses continuous past, type OG karatau hū̊tau > MG kartɔ, hətɔ, has just come into existence and others are to come in the wake. Thus this language has unmistakable marks of the Gujarati language. It is not desirable to call it either an Apabhraṃśa or Old Western Rajasthani. The term Apabhraṃśa applied to this language will require a connotation quite different from its ordinary one. How is it possible, for example, to call as Apabhraṃśa the languages treated by Hem. in his Gram. and the OG language of the 12th century which are widely apart from one another? The name OWR is unauthorised. Neither the word Rajasthāna nor the name Rajasthani appears to have existed in literature of more than two centuries old, nor have we any evidence that the language spoken over modern Rajasthan was ever called Rajasthani in the past. On the contrary we have references reaching as far as the 11th century in which the language of the whole Rajasthan-*cum*-Gujarat tract was called the "language of Gujarat." Moreover, MG has remained more faithful to this form of language than the various Rajasthani dialects, by preserving the neuter gender, and by retaining such other characteristics as would warrant unbroken continuity of linguistic tradition, while the Rajasthani dialects have lost some important old features under the newly established influence of the central WH. It is therefore desirable to call this language as Old Gujarati rather than by any other name. This should not be considered to be conflicting in any way with what is said above that Marwari and Malvi severed their connections with Gujarati as late as the 15th century. The traditions of Gujarati are more powerful and continuous than those of any Raj. language. Moreover a language does not cease to be called by its old name when a part or parts of its area fall off its linguistic unity. Śauraseni has had several such amputations and still it has retained its original name and its central position.

38. *A sketch of the OG Grammar :*

Following is a brief description of the OG of 1200 A.D. to 1600 A.D. In nouns there were two main types : (*a*) the old type in which the intervocalic stop at the ending part of the word did not disappear, *i.e.*, the type where OI hastas > MI hattho > OG hāthu ; and (*b*) the new type where this consonant disappeared bringing the two vowels together, *i.e.*, type : OI ghotakaś > MI ghoḍao > OG ghoḍau. In the old type there were only three sub-types namely, (i) the first consisting of OI and MI nouns in -a, and -u : thus OI hastas, etc., and OI cañcus gave OG hāthu and OG cāṃcu ; (ii) the second consisting of nouns in -ī̆ m.f.n. OI hastiṇ > MI hatthī > OG hāthi (-u, extended) ; OI akṣi > MI akkhi > OG ākhi̊. (iii) The -ā of the old fem. nouns was contracted into -a : *e.g.* I mālā > MI -māta > OG māla. The second or the new type was very large ; in fact many nouns from the old type were extended to this type by the addition of -u m ; uṃ n- to facilitate the expression of gender. In this

class nouns ended in -au, āu, īu, ūu, eu, ou in mas. and in -aum, āum, etc. in n. ; the fem. ended in -ī. The nouns in -au and -aum of this class developed into the so-caled strong class in Mod.G. There were no different forms to express sing. and pl. in the old class except in loc-inst. case, but the new class made this distinction in the Direct also. There were 3 cases, the Direct the Oblique and the Instrumental-locative. The old class distinguished only the last from the first two, while the new type distinguished all the three. Occasoinally, the Inst. sg. was distinguished from the loc. sing. by a nazalization. Thus the forms were as follows :—

	Old type.		New type.		New type.	
	nāthu m.	nāku n.	ghoḍau m.		ghaṇauṃ n.	
Direct..	..hāthu	hāthu	ghoḍau	ghoḍā	ghaṇauṃ	ghaṇāṃ
Obl. ..	..hāthu	hāthu	ghoḍā	ghoḍā	ghaṇā	ghaṇā
Inst. loc.	..hāthi(-iṃ) f.	hāthe	ghoḍai(-iṃ)	ghode	ghaṇai(iṃ)	ghaṇe.
Dir. obl.	..māla	mala				
Inst. loc.	..mala-iṃ	malaiṃ				

In the verb, there were the old present and future tenses in the Indicative mood both made from the present stem. They distinguished 3 persons and 2 numbers :

	Present.		Future.	
1st pers.	haum karauṃ	amhe karauṃ	haum karisu	amhe karisuṃ
2nd pers.	tauṃ karaiṃ	tumhe karau	tauṃ kurisi	tumhe karisau
3rd pers.	te karai	te karaiṃ	te karisii	te karsi-iṃ

In the Imperative, only the second and third personal forms were available :

2nd pers.	kari	karau
3rd pers.	karau	karau.

Among the derivative verbs only passive and causal forms are found. The *passive* has four types ; (i) The old type without -ya : (ii) The old type ending in īja and (iii) a third old type in -īa : examples : rācai, kījai and jāṇīe. The new type in -ā- is rare : samārāi, bharāi. This type becomes a regular feature in MG. The *causal* has 3 types : (i) The Direct type : bālai ; (ii) the -āvai type : karāvai ; (iii) the new -aḍai type : deṣāḍai. This new type, heralded in Hem., becomes very frequent in Mod. Guj. The passive old types īja and īa are derived from pkt. ijja and iyya both of which developed from OI -īya. The causal -āvai <MI -āvai, āpeti <OI -āpayati. The *participles* are (i) the present unenlarged : paḍata (ii) the present enlarged : jāṇatau (iii) the pres. passive formed from OG passive stem : damītau. All these are derived from the OI participles in -at which in MI ended in -anto which in old G. gave atu or ata, extended to -atau. The old passive pres. part. in -āṇau extended from -āṇa <MI mano <OI -mānas is also found in many cases : mūkaṇā. The *past participles passive* are (1) the general type in -iu (< OI -ita, MI -io) : paḍiu ; (2) in -dhau (from MI -iddha extended, from OI radical ending dht -ta-). (3) in -au (extended from -kka OI or MI -tta etc.). cūkau, matau, etc. The *potential participle ended* in -vaum <OI -tavya or -itavya=MI -iavva or -evva, extended : jāṇivaum.

Following *post-positions* were found : nau, tanau, jev-au, jevd-au, jog-au, sarakh-au thau, which were declinable, while sium, śūm, ūpari, pāse, māhi, tau, naim were indeclinable. Besides there were many fossilized case forms of nouns which were used as adverbs, *e.g.*, pūṭhi bāhiri, ima, jim, etc. Of the *pronouns*, there were (i) the personal pronouns haum, taum,; (ii) relative pronouns : je, te ; (iii) The demonstrative pronoun e (distant) and ā (near). (iv) The interrogative pronouns : kauṇa m. kisī f. kisium n. (v) Indefinite pronoun : anerau, (vi) The reflexive pronoun āpanapaum. There were (vii) pronominal adjectives, adverbs and phrases also : isium, kīsium adj. ; ihām kihām, adv ; jamkoi, savikaha. Phrases, numeral nouns, and their ordinals and adverbs also were in free use : the cardinal pāmca ; ordinal pāmcamau - adv. pahilaum. Words for groups are also found : cauka, sataum.

It was from this language that the Mod. G. came into existence during the 17th century.

39. *Entry of Foreign Elements at Various Stages :*

When two languages come into contact, they cannot avoid interaction which ultimately yields various results. If one of them belongs to the people who have no civilization, linguistic tradition and literature, written or oral, it is likely to be superseded by the more powerful and cultured language ; and within a century or two after the contact has been established, the weaker language disappears, leaving, all the same, at least some traces on the superseding language in the form of loan-words, a grammatical category or at least a few terms of expression. Thus, the Munḍa language which was overlaid by the Dravidian languages before the Aryans entered India provides a good illustration of the above principle. The Munḍas were uncivilized hunters and the Dravidians had a culture, well-developed. They therefore practically totally superseded the Munḍa forms of speech and as a result the Munḍa speeches disappeared from the plains and resorted to hilly parts where the Dravidians had not yet penetrated. But even in the dying state, it left some marks on the Dravidian languages. Thus the existence in Munḍa languages of the animate and inanimate genders, of the 1st pers. pl. exclusive and inclusive forms, and of the glottal stop have produced similar characteristics in the Dravidian languages and, one of them, namely, the exclusive and inclusive 1st pers. pron., has come down to Gujarati, through the Dravidian influence. But when the two languages are strong enough from cultural point of view, some external circumstance helps one language to drive out the other. This case is illustrated by the conflict of the Aryan and the Dravidian tongues, when the Aryans entered India. Both languages were fully cultured and strong enough. But the Dravidian forms were but recently superimposed on the Munḍa-speaking people, in whom the Dravidian habits of articulation had not yet firmly been rooted ; while the Aryans were speaking the OI for centuries. So that when the conflict came, the aboriginal tribes cast off their newly acquired language-habits more quickly than the Aryans. But by the time when the Aryan speech and civilization reached south, many centuries after their entrance in India, the Dravidian speech-habits were firmly fixed in the southern speakers and consequently they could not be ousted out. But the Dravidian speeches, in the north even while disappearing have left indelible prints on the

Aryan speech. Thus, the loss of one or two genders in many Indo-Aryan languages, the agglutinative way of showing gender and number by compounding a separate word as seen in Eastern Mod.I., the whole structure of post-positional phrases in all Mod.I. languages, the development of a class of indeclinable adjectives, the creation of periphrastic passive in a majority of Mod. Ind. languages, the participle construction of sentences instead of the verbal constructions, the development of the whole class of cerebral consonants and loss of many OI features ; such and many other features which are just now the very life of Mod.I. have come to exist under the Dravidian substratum influence.

40. *Loan-words in Gujarati :*

Besides, a very large number of loan-words from the Dravidian languages are imported into the Aryan speech, right from the earliest times. The ṛgveda and other samhitas, the Brahmaṇas and the Sūtrā literature abound in such words. But by the time when the OI developed into the MI they had become so numerous that special dictionaries of the Deshya, *i.e.*, local words were to be composed and their use in literacy compositions was permitted. Hemacandra's Deshinama mālā and such other books illustrate this point remarkably.

Besides, there was already in existence an activity on a large scale in the MI stage of borrowing words from sister MI languages. Thus the word ṛiccha-'a bear' in Śans. is a lw. from an eastern dialect which changes -kṣ- to -chh-, as that change is foreign to Śaur. which changes -kṣ to -kh- as in OI rakṣati which gives Śaur. rakkhai, etc. A large number of lws. have been detected in every MI dialect by the above process.

Coming to OG, we find that it possessed two additional classes of lws. besides those inherited by it from the MI stage : (i) The classical Sanskrit words, (ii) and words from sister Mod. I. languages. The classical Skt. lws. are divested of their Skt. terminations and OG terminations are added with slight modification at the end, if necessary : thus : parameswaru kathai chai. In religious books and books of literature written by men of learning, the proportion of these cultural lws. mounts very high indeed ; but luckily, in the speeches of ordinary persons meant for practical utility they are in woeful minority. Coming to the other class of words borrowed from sister languages, their first trace is found in the 15th and 16th centuries. The contact of the Mahomedan had given a large number of words of Persian and Arabic origin in the language of Madhyadesha. When these Mahomedans came to Rajasthan and Gujarat and waged wars which sometimes lasted for more than 12 years the language of their armies, which was a form of Old Urdu, gave the OG language a few foreign words for the first time. These words belong to the military political and hunting terminology : *e.g.* pātasāha, phuramāṇa, bāj. It should be noted that Gujerati has not borrowed these words from the original Persian or Arabic sources, but directly from the OH. and O.Urdu dialects in mutilated forms which were further changed at the time of their borrowing to suit the speaking habits of the Gujeratis. It is, therefore, futile to show ultra-purism by trying to speak

or write them in their original Persian or Arabic forms: *e.g.* G paṛdɔ should not be written or pronounced as pardeḥ or some such thing.

Coming to the Mod.G. stage, a large number of foreign sources have been added to the above ones. They are the European words. Following is the complete classification of the sources of lws. into Guj. (i) The cultral source: Sanskrit, (ii) the Dravidian-Munda Source: Deshya words (iii) words from sister MI languages taken during the MI stage: (iv) words from sister Mod. I. languages. Marathi, (pantoji), Bengali, Rajasthani, (raoji), Punjabi, (batti), Sindhi, Hindi, (bansi) Urdu, etc. Urdu in its turn borrowed from Persian and Arabic. Some such Persian words are ajmaeś, ābādi, kharid, gumāstɔ, gujarān, tājgi, tavangar, tandurasti, dastāvej, dariyɔ, pyalɔ, etc. Arabic akal, abehūb, insāf, ijā, eb, kharc, takrar, hukam, salah, etc. Then there are Portuguese, Dutch and English words:

Portuguese: pagār, palṭaṇ, lilām, cāvi, mosaṃbi, bāk,

Dutch: valaṇdā.

English: rasīd, dāktar, būṭ, apīl and a large number.

MODERN GUJARATI

Important facts of the Modern Gujarati are noted below:—

PHONETICS:

41. *Organs of Speech:*

For the generation of Gujarati sounds, following organs of speech are used: (i) Lungs, which supply breath; (2) the Larynx with two vocal cords which when stretched produce voice and when loose produce breath. Just above the vocal chords, there are two small lips called false vocal chords which are useful for the whisper. The remaining organs are classed as the upper and the lower organs. The lower organs are (3) the tongue which is divided into (*a*) the root, (*b*) the back, (*c*) the front, (*d*) the blade and (*e*) the tip of tongue. Next come (4) the lower teeth and (5) the lower lip. The upper organs are (6) the pharinx or the throat wall just opposite to the root of the tongue, (7) the soft palate or the velum which is adjustable, (8) the hard palate divided into the front and the back hard palate, (9) the teeth-ridge, which is convex to the tongue and which is divided into (*a*) the centre or the most elevated portion and (*b*) the upper end which joins with the palate and (*c*) the lower end near the teeth. The next organs are (10) the upper teeth and (11) the upper lip. Apart from these there is the (12) Nazal cavity. When the velum is fully or partially lowered, this cavity opens and the breath escapes partially or wholly through the nose, giving rise to nasal sounds. A few more organs, like uvula, are not mentioned here as they are not useful for generating Gujarati sounds. A table of upper and lower organs coming opposite to each other when the tongue is in normal position is

given below as it is of immense importance for the classification of linguistic sounds :

Upper Organs :	Pharinx	Soft palate	Hard-back-palate	Hard-front-palate	Teeth-ridge	Teeth	Lip
Lower Organs :	root	back	f r o n t		blade	tip	lip
	t h e t o n g u e						

Generation of Sounds: When the lower organs of speech come in actual contact with the upper ones, or when both come so close together that they create a sort of obstruction to the free passage of air, we get the consonant sounds. The obstruction may be in the form of a complete blockade of air resulting in total silence which gives rise to *stop-consonants* ; or it may be a partial blockade giving rise to friction or a wizzing sound, in which case the consonants produced are called *fricative* ; or again the obstruction may be a mere tap or taps of the tongue against the roof giving rise to *tapped or flapped consonants* ; or the blade of the tongue may be kept firmly fixed with the roof and the air may be allowed to pass through one or both sides of the tongue giving rise to *lateral sounds.* During all these processes, the vocal chords may vibrate or may not vibrate and the consonants may consequently be *voiced* or *unvoiced.* The generation of nazel consonants takes place when over and above the different adjustments mentioned above the velum or the soft palate is lowered and the air is allowed to escape through the nose also. When there is no obstruction to the air whatsoever even if the tongue is adjusted for the various positions, we get the *vowel souuds,* pure as well as nazel.

42. *The Classification of Vowels :*

Vowels are classified according to the position of the tongue. When the front of the tongue is raised as high as possible consistent with the position of the generation of vowel sounds and the back of the tongue is not raised, we get the front high or the front closed vowel. By lowering the front little by little we get a series of front vowels which are half-closed, half-open and open respectively. Similarly, when the back of the tongue is raised to the highest position consistent with the generation of vowel sounds, we get the highest-back-vowel called the closed-back-vowel ; and then by lowering the back of the tongue little by little, we get a similar series of half-closed, half-open and open back vowels. The quality of the vowel is clearer, the more it is closed in front or back. It becomes blurred or indistinct when instead of the back and the front parts of the tongue, the middle of the tongue plays a part in its generation without being raised or lowered to any remarkable degree, or shortly, when the tongue is nearer its normal position. The vowels generated in this way are called central, some of which are nuteral. The following fig. gives in a tabular form the characteristic highest position of the tongue indicated by a dot at the time of the generation of each particular vowel-sound. These are the ideal positions or the positions for what are called the cardinal vowels. The positions for the Gujarati vowels are indicated by small squares in the same figure for the convenience of comparison. *

* *Vide* Appendix I.

These are the pure vowels. There are also the *nazal varieties* of Nos. 1, 5, 6, 7, 10, 12. When a close vowel is nazalized it opens up slightly, and the front vowel tends to go back under the same circumstances. There are only two true *diphthongs* əi and əu as they are syllabic. The group āi and āu are often contracted into these diphthongs. There are several vocalic groups of two or more vowels but they form more than one syllable : *e.g.*, ui, eo, eu, ei, oi, oie, etc.

43. *Consonants :*

Stops have 3 movements : the on-glide, implosion or the movement of adjustment of the organs ; the stop or the position of utter blockade of the air-current ; the off-glide, explosion or the movement of release. The last movement plays larger part with regard to the audibility of the stop. If the air force is extra-strong we get aspirated stops, if it is ordinary we get stops. If vocal chords vibrate during this time we get the voiced sounds, otherwise we get the unvoiced ones. When the stop is made by two lips we get labials ; when it is made by the tip of the tongue against the upper teeth, we get dentals ; when the front of the tongue stops the air passage at the back or the front of the hard palate we get palatals of various kinds ; and when the back of the tongue creates a stop with the velum, we get the velers or the so-called gutteral sounds. In the above cases, the various parts of the tongue come into contact their respective upper organs (see chart above) ; but in creating the retroflax sounds, the so-called cerebrals or linguals, a part of the tongue (usually, the tip or the blade) touches not its normally upper organ but the one which is farther inside the mouth removed from it by one or two steps. Thus the tip does not touch the teeth, but the teeth-ridge or hard-palate ; the blade of the tongue does not touch the teeth-ridge, but the hard palate, and so on. Gujarati has that class of retroflax sounds in which the tip of the tongues stops the breath at the front-hard-palate. A table of Guj. consonants is given below :—

Consonants in Gujarati

	Bilabial			Dental			Post alve-olar	Palatal			Veler			Retroflex			Pharingial		Total
	Voice-less	Voiced	Nazel	Voice-less	Voiced	Nazel	Voiced	Voice-less	Voiced	Nazel	Voice-less	Voiced	Nazel	Voice-less	Voiced	Nazel	Voice-less	Voiced	
Stops unaspirated...	p	b	m	t	d	n	...	c	j	ñ	k	g	n	ṭ	ḍ	ṇ	...	...	25
aspirated ...	ph	bh	...	th	dh	...	...	ch	jh	...	kh	gh	...	ṭh	ḍh	...	...	...	...
Flapped unaspirated...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	ṛ	...	...	...	2
aspirated ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	ṛh	...	..	...	...
Fricative ...	...	...	...	s	z	..	r	ṡ	(ż)	...	...	...	...	ṣ	(ẓ)	..	(ḥ)	h	6
Lateral unaspirated...	...	...	...	...	[l]	...	l	...	[l]	...	...	...	...	...	l̤ (flapped)		...	...	3
aspirated ...	...	...	...	...	.	...	...	...	..	...	...	...	...	...	l̤h (flapped)		...	...	2
Semi-vowel ...	...	v	...	.	...	...	...	...	y	...	..	...	...	...	...	...	...	...	...

The pronunciation of l with secondary basis of articulation are enclosed in parenthetical brackets: [l].

Rare sounds are enclosed in small brackets: (ż), (ẓ), (ḥ).

Consonants in Common use ... 38
Rare Consonants 3

Total Consonants ... 41

Thus, there are 12 pure vowels, 6 nazalized vowels, 2 diphthongs and 41 consonants *i.e.*, in all 61 ounds in Standard Gujarat language.

44. *Morphology :*

Gujarati words can be grouped into the four traditional classes. They are (i) the Nouns, including substantives, pronouns, numerals and adjectives ; (ii) the Verbs including the temporal and modal forms, and participles ; (iii) The Adverbs and post-positions and (iv) the Indeclinable particles. Nouns, some participles, adverbs and post-positions have declinations, verbs have conjugations while the particles have only one immutable form.

45. *Nouns :*

Gujarati nouns end in (*a*) one or more vowels, pure or nazal and in (*b*) one or more consonants. Thus, bā, bhābhī, bāpū, vhɛ, gho end in a single vowel ; while bāi, ghaũ, kui, phoi, saraio, etc. end in two or more vowels ; and ghar, lok, pātr, kʌṣṭ end in one or two consonants. Morphologically, they can be grouped as (i) the strong nouns and (ii) the weak nouns. The strong nouns distinguish number, gender and case by special forms, while the weak ones distinguish only the Inst. loc. case from the Direct-oblique. The nouns ending in -ɔ, all masculine, and those in -ũ, all neuter, are strong ; the remaining are weak.

46. *Number :*

There are two numbers in Gujarati, the singular and the plural. Weak nouns do not distinguish them ordinarily, while the strong nouns do. Thus hāth sg. and pl. ; bā sg. and pl. ; bhāi sg. and pl. ; but ghoɔ sg., ghoɔ̣ā pl.; chokrũm sg., chokrā pl. But to make the plural explicit in a sort of formal way the vowel -o is added on to the weak nouns and also, for the sake of uniformity, to the strong nouns at the end. In ordinary conversation, however, it is not often used, the idea of plurality being left to be gathered from the context. Thus : hāth sg. hāth-o pl. ; bhāi sg., bhāi-o ; ghoɔ sg., ghoɔ̣ā-o pl. ; chokrũ sg., chokrā-o pl.

47. *The Case :*

There are 3 cases in Gujarati : (1) The Direct for the Nominative and Accusative (2) the Instrumental Locative, a common form for the two cases and (3) the Oblique for the other cases and for appending the post-positions. There are no separate treminational forms for sg. and pl. except in the Direct case of strong nouns. The strong nouns distinguish the three cases, but the weak ones have a common form for Direct and Oblique, which differs from the Inst. Locative form. The old Inst. Loc. forms of the weak nouns have been levelled down by usage and have fallen together with the Direct-Oblique form, leaving thus a single form to express all cases and numbers. But later on the termination -e was superadded to the old Inst. Loc. forms to distinguish them from the Direct-Oblique forms. Gender does not affect the case forms of weak nouns. Declinations of noun differ from those of adjectives. They are, therefore, treated separately.

Weak Substantives :

	Vowel-ending		Diphthong-ending		Consonant-ending	
	Sg.	Pl.	Sg.	Pl.	Sg.	Pl.
Dir.-Obl. ..	hāthī	hāthī or hāthī-o	bhāi	bhāi or bhāi-o	hāth	hāth or hāth-o
Ins. Loc. ..	hāthī-e	hāthī-e or hāthī-o-e	bhāi-e	bhāi-e or bhāi-o-e	hāth-e	hāthe or hātho-e

Stong Substantives :

	Ending in -ɔ m.		Ending in -ũ n.	
	Sg.	Pl.	Sg.	Pl.
Dir. ..	ghoɽɔ	ghoɽā or ghoɽā-o	chokrũ	chokrā or chokrā-o
Obl. ..	ghoɽā	ghoɽā or ghoɽā-o	chokrā or chokrã	chokrā or chokrā and chokrā-o
Inst. Loc. ..	ghoɽɛ or ghoɽā-e	ghoɽɛ, ghoɽā-e or ghoɽā-o-e	chokrɛ, or chokrā-e or chokrã-e	chokrɛ, chokrã-e or chokrā-o-e

It will be seen from the Inst. Loc. forms above that there is a tendency to create longer forms by adding an inorganic -e in m. and n to the oblique forms on the analogy of weak nouns. The -ɛ in strong nouns is organic. It is easy to see that in n. nouns an attempt is made in the newly-constructed forms to distinguish the neuter gender from the masculine in the oblique and Inst.-Loc. cases by nazalizing the vowel -ā. This is an innovation. In future, we shall refer to the new pl. forms arrived at by adding -o and the new Inst.-Loc. forms arrived at by adding the inorganic -e, as the periphrastic pl. and the periphrastic Inst.-Loc. forms.

Adjectives.

Adjectives are not subjected to the innovations described above, *i.e.*, they have no periphrastic forms ; they stick to the inherited ones. Thus, the weak adjectives have only one form for all genders, numbers and cases, *e.g.* :

		Vowel-ending	Diphthong-ending	Consonant-ending
Dir.-Obl. Inst.-Loc.	Sg.-Pl. ..	khālī	kamāu	lāl.

The strong adjs. have the same old forms as the strong substantives, *i.e.*, they have no periphrastic forms : thus

	Strong m. saɽɔ 'good'		Strong n. sārũ 'good'	
	Sg.	Pl.	Sg.	Pl.
Dir.	Sāɽɔ	Sārā	Sārũ	Sārã
Obl.	Sārā	Sārā	Sārā or Sārã	Sārā or Sārā
Ins. Loc.	Sāɽɛ	Sāɽɛ	Sāɽɛ	Sāɽɛ

The declinable adverbs follow these forms.

48. *Pronouns :*

There are (1) the Personal pronouns, (2) the Demonstrative pronouns, (3) the Relative pronouns, (4) the Interrogative pronouns, (5) the Indefinite pronouns, (6) the Reflexive pronouns and (7) the pronouns of mutuality. There are also pronominal adjectives and adverbs.

The personal pronouns, 'I' and 'you' : Forms of these pronouns are based on mutual analogy and have influenced each other during their development.

	'I' hũ			'you' tũ	
	Sg.	Pl. (exclusive)	Pl. (inclusive)	Sg.	Pl.
Nom.	hũ	amẽ	apṇẽ	tũ	təmẽ
Acc.	mənẽ	amnẽ amonẽ	apəṇ-nẽ	tənẽ	təm-nẽ
Inst.	m-ẽ	am-ẽ	apṇ-ẽ	t-ẽ	təm-ẽ- or təm-o-ẽ
Geni.	mā-rɔ -ri, rũ	amā-rɔ, ri -rũ	āpṇ-ɔ, -i, -ũ	tā-rɔ, ri, rũ	temā-rɔ, -rī, -rũ
Obl.	mā-rā	amā-rā	āp-nā	tārā	təmā-rā

The exclusive forms are used to exclude the person talked to and the inclusive forms are used to include him. In the 1st per. sg., there are two different roots, m- which also appears as mā, and h- in hũ. In the pl. the root is am-, which also appears as amā or amo-. In the 2nd person the root is t- which appears also as tə, tā, in sg. and in the pl. it is extended to təm or təmā-, təmo-. The remaining elements are the terminations and post-positions. There is a 2nd pers. pl. pron. āp- which shows respect. It is weak, *i.e.*, does not change in the declinations.

The Relative and the Demonstrative pronouns are taken together. They are :

	Near Demonstrative.		Farther Dem.		Relative antecedent.		Rel. Consequent.	
	Sg.	Pl.	Sg.	Pl.	Sg.	Pl.	Sg.	Pl.
Nom.	ā	ā	e	e	je	je	te	te
Inst.	ā-nẽ	ām-nẽ	e-nẽ	em-nẽ	je-nẽ	jem-nẽ	te-nẽ	tem-nẽ
Obl.	ā	ā,ām ām-nā	e	e, em, em-nā	je	je, jem or jem-nā	te	te, tem or tem-nā

The roots are ā, e, je, te. The inst. sg. forms are historical ; the forms ām, em, jem, etc., and their extended varieties ām-nā, etc., are made on the pattern of the personal pronouns.

The Interrogative and the Indefinite pronouns are taken together. The Int. kɔn does not change gender ; but the Int. śũ does. The Indefinite pronouns have no gender ; only kə̃i shows inanimate thing.

	The Interrogative kɔn		The Interrogative śũ		The Indefinite koi, kə̃ĩ
	Sg.	Pl.	Sg. m.f.n.	Pl. m.f.n.	Sg. & Pl.
Direct	kɔn	kɔn	śɔ śi sũ	śā śī sā	koi, kə̃ı
Inst.	kɔn-ɛ or kɛ-nẽ ;	kɔnɛ, kɛ-ũẽ	śā-nɛ or śɛ-nɛ		koi-e nil
Obl.	kɔ or kɛ	kɔ or kɛ	śā or śɛ		koi kə̃ĩ

The Direct forms are historical. In the obl. and in the Inst., the forms kɛn-kɛ-, śɛn-, śɛ- are older than those with -ɔ-.

The reflexive pron. pote always sg. and the pronoun of mutuality ek -bijɔ m., ek -bījī f., ek -bījaũ n. are really speaking nouns. Pote is defective, it has no nom. sg., although in OG. it existed as potaum. The Inst. pote is used for the nom. as well as the Inst. The oblique form is potā. The pronoun of mutuality, ek-bijɔ is declined like the strong substantive.

The pronominal adjectives are generally the m.f.n. genitive forms of the pronouns: mā-ṛɔ, mārũ, təma-rũ; also some inherited adjectives: je-vũ, ke-vũ, te-vũ, e-vũ showing similarity; je-varũ, e-varũ, ke-varũ showing size; je-ṭalu, teṭalũ, ke-talũ, e-ṭalũ showing quantity. They are declined like strong adjectives. The prominal adverbs have been also inherited: j-yā̃, t-yā̃, k-yā̃ showing place; j-yārɛ, t-yārɛ, k-yārɛ, a-t-yārɛ, showing time; j-em, t-em, k-em, e-m showing manner. These are indeclinable.

49. *The Numerals:*

The Numerals in Guj. are weak substantives and are declined like them: ek 'one' is sg., others are pl. Forms: Dir. Obl. sg. or pl. ek, pāe̊; Inst. Loc. sg. or pl.: eke, pāe̊-e. There are ordinal adjectives made from the numerals: pəhɛlũ, bī-jũ, trī-jũ, cɔ-thũ, pāc̊-mũ, cha-ṭṭhũ, sāt-mũ and so on by adding, mɔ m, -mī f and -mũ n. to the other cardinal numbers. The Dir. n. sg. of the ordinal adjectives is used adverbially as bijũ, 'secondly.' Adverbs of frequency are formed by adding -vār to the fem. obl. of the cardinal and ordinal adj. *e.g.*, biji-vār, '2nd time' trījī-vār, '3rd time'; but bɛ vār 'twice' trʌn-vār 'thrice,' etc. The word gənũ is added to show the repetition: pāc̊-ganũ 'five times.' The nouns for groups of numbers are historical: belũ, tre-lũ, cɔk, cɔlũ, pañcɔlũ, pañjɔ, das-kũ, kɔri, saikɔ, saik-ṛɔ, derived from various sources. They are declared like the substantives.

50. *The Verbs:*

The MG verb shows two tenses, the Present and the Future in the Indicative and Imperative moods. Besides, it has a large variety of participles. The derivative verbs are the passive, the causal and the nominal verbs with tenses, moods and participles, as the primitive ones. These verbs distinguish 3 persons and two numbers in the Indicative and only the 2nd and the 3rd persons with two numbers in the Imperative mood. For the purpose of Conjugation, a verb is either weak or strong. Strong verbs for historical reasons show some changes in the stem and some difference in terminations. Weak verbs show no peculiarity. Roughly speaking, the verbs ending in a vowel are strong, while those ending in a consonant are weak. We shall treat the weak verbs first as terminations, etc., are transparent in them: The

future is differentiated from the present by the characteristic ś, the terminations being the same except in the 1st pers.

Weak verbs : kar 'to do.'

	Present.		Future.	
	Sg.	Pl.	Sg.	Pl.
1st prs.	(hũ̃) kərũ̃	(əmɛ̃) kər-īe	kər-ī ś	kər-śũ̃, kər-īśũ̃
2nd prs.	(tũ̃) kər-ɛ	(təmɛ̃) kər-ɔ	kər-śe-e	kər-ś-ɔ
3rd prs.	(te) kər-e	(te-o) kər-ɛ	kər-śe-e	kər-ś-e

Strong verbs : present.

	jā 'to go'		pī 'to drink'		dɛ 'to give'		jo 'to see'	
1st	jā-ũ̃	jā-ie	pī-ũ̃	pī-e	daũ̃	daũ̃-ie	jo-ũ̃	jo-ie
2nd	jā-y	jā-ɔ	pī-ɛ	pī-ɔ	dɛ	dy-ɔ	ju-ɛ	ju-ɔ
3rd	jā-y	jā-y	pī-ɛ	pī-ɛ	dɛ	dɛ	ju-ɛ	ju-ɛ

Strong verbs (Future).

1st	ja-īś	ja-ś-ñ̃	pī-ś	pī-ś-ũ̃	da-iś	da-isũ̃	jo-iś	jo-iśũ̃
2nd	ja-ś-e	ja-ś-ɔ	pī-ś-e	pī-ś-ɔ	de-ś-e	de-ś-ɔ	jo-ś-e	jo-ś-ɔ
3rd	ja-ś-e	ja-ś-e	pī-ś-e	pī-ś-e	de-ś-e	de-ś-e	jo-ś-e	jo-ś-e

Strong verbs following the above patterns according to their ending vowels. In passive, all verbs strong and weak ending in ā, but they do not shorten their ā in the Future. Thus : khavā-ś-e "will be eaten," mər-ā-śe.

51. *Participles :*

Active Participles are formed by adding different suffixes to the present active stem and passive participles are formed by adding suffices to the passive stem. When they are extended, they distinguish gender and number ; but the unextended ones do not. The absolute participle and the Infinitives are formed by adding suffixes to the present stem of the verb. Following participles are available in Gujarati :

1. *The present participle* active is obtained by adding -at which appears (i) in the extended forms as in -tɔ m.; tī f ; tũ̃ n. and (ii) in the unextended forms as -at; its -a- merges with the preceding vowel in case of strong verbs : Thus, extended jāṇ-tɔ, -ti, -tũ̃ ; de -tɔ, -ti, -tũ̃ ; unextended : jān -at, de-t, pī-t.

2. *The past participle* appears in several forms all of which are of the extended variety. The OI past part. suffix -ta was directly applied to some consonantal roots and as a result of assimilation of the two consonants, different consonantal groups developed, which were reduced to double consonants in the MI ; these double cons. were reduced to single ones in the Mod.I. and the whole form was extended. This is an *irregular class.* Thus khā-dhũ̃, dī-dhũ̃, pī-dhũ̃, sū-tũ̃, bhinũ̃, etc. (i) When the -ta was applied with a connecting -i-, the conjunct was avoided and the form developed into -io m in the MI. It became -iu in Apbh, iu in OG and -yɔ m. -ī, f- and -yũ̃ n in MG. Examples : jāṇ -yũ̃n, lakh-yɔm, pā-yũ̃n, ga-yũ̃n, dekh-ī f. This is the *regular type.* (ii) There is another type of the p.p., of wide application, which developed only in 16th century, and which is *characterised* by -el (unextended) and

etɔ m., -eli f. elũ n, (extended). Examples: unextended kər-el bol-el, ləkh-el, jo-el; extended: kər-etũ bol-elũ, ləkh-elũ etc. In some cases this suffix was added on the top of the old Past Participles. *e.g.* pīdh-el or pīdh-elũ; dī-dh-el or dī-dh-elũ, etc. khā-dh-el or khā-dh-elũ etc.

(3) The Potential participle ends in -vɔ m.; vī f, -vũ n. and is obtained directly from the present stem: khā-vũ, kar-vũ, jo-vũ, le-vũ, pīvũ, etc.

(4) The Indeclinable participle ends in -ī. Strong verbs take some modifications before this suffix: v. de, Ip, da-ī; v-pī, Ip, pī; v. jo, joī; v. kār, Ip. kār-ī; v. lakh-Ip. lakh-ī, etc. The Infinitive has fallen together with the Indeclinable participle. Both have identical forms.

5. *Passive Participles:* All the above-mentioned participles can be formed from the passive and causal stems of the verb: Thus: passive participles: kar-act., kərā--pass, kər-ā-tũ pr. p.; kər-ā-yũ p.p.; kər-ā-vũ, pot.p. Causal participles: kar-prim., kər-āv-the causal stem: kər-āv-at pr.p., kər-āv-to, pr.p.ext., kər-āv-vũ p.p., kər-āv-vũ pot.p., etc. An OI passive participle has been inherited by M.G. It ends in -āṇɔ m; -āṇī f, -āṇũ n. In OI it was the present participle, in MG. it has got he sense of the p.p., as in bolāṇɔ, 'was spoken', etc.

The OG formed its passive stem by adding -ī-: as OG jāṇai 'he knows', jān-ī-i 'it is known.' Regular passive participles formed from this stem are common in OG. But this passive has fallen into disuse and so also the participles. But some participles have survived as adjectives in MG.: jāṇ-ī-tɔ pres. part. pass. now adj; 'well-known,' dekh-ī-tɔ, apparent,' etc.

52. *Derivative Verbs: I The Passive:*

The passive stem is obtained by adding -ā- to the active stem of weak verbs and -vā- to those of the strong verbs. The radical a and ā are shortened to ə. Examples: Weak verbs without a radical a or ā: jit- act., jitā- pass. dekh act. dekh-ā; with 'a': paṛ. -act, pəṛ-ā-; with -ā-, mār act., mər-ā--. Strong verbs: de act., devā- pass. pī act., pi-vā- pass, etc. The passive is conjugated like the strong verb ending in -ā, except in future (see para 50 above). Formation of passive participles are described above (51 (5)).

53. *II The Causal:*

1. The causal stem is obtained from the primitive pres. stem by adding the suffix -av- or -āv-, or -ār- or -ār-; or by various combinations of av and ār, āṛ, such as -vāṛ-, -ərāv-, -əṛāv-, -vərāv-, vəṛāv- added to the primitive roots. The rules of distribution of these suffixes in the verbs are too complicated to be mentioned here. The radical a or ā becomes ə and a long ī or ū becomes short before any one of these suffixes. The suffixes beginning with -v- are generally taken by the strong verbs. The last four suffixes are for the double causative forms. The suffix -āv- is the commonest: kar-, kər-āv-; bhaṇ-, bhəṇ-av- (old), bhəṇ-āv- (new), dhāv-,dhəv-āṛ-; sū-, su-vār-; khā-, kha-vərāv- or kha-,vəṛāv- or khə-vār- or khə-vāṛ-; de, de-vār- or de-vəṛāv-, etc.

2. The Old Indian causal has remained in MG in many verbs, but it is, now, more useful for converting an intransitive verb into the transitive, with the causative sense altogether superceded in many cases and a new verbal sense developed in a few. The transitive formation is also accompanied by a high-grade radical vowel in the stem. Thus, the radical 'a' becomes ā, regularly and 'e' sporadically. Often a causative suffix is found added on the top of the transitive stem :—

Examples :

Intransitive.	Transi.	
pʌṛ	Pāṛ-	These verbs are conjugated like the weak verbs ; their participles are described above (see page 50).
dʌb-	dāb-	
mʌr	mār	
uchar-	ucher-	
phʌr	pher-av-	
khas	khas-eḍ-	
pī-	pā-	
maḷ-	meḷ-av-	
bhaḷ-	bheḷ-av-	
ṭhar-	ṭher-av-	

III. The Nominal Verbs :

3. Some nouns are used as verbs, though the practice is not well-established. They are declined like weak verbs : ajavaḷu 'light,' ajvāḷɛ v. 'to light '; dhoḷu adj. 'white', dhoḷɛ 'to white-wash' ; lābu adj. lambāvɛ, verb.

54. *Post-Positions :*

True post-positions are the case forms of old nouns which have lost their meaning entirely and acquired grammatical function. They are not used independently, but only after a noun and express relations including those formerly denoted by different cases. They are strong and weak, the strong showing different forms for gender number and case and are declined like adjectives. They are : valī, vəṛɛ for the Instrument, nɛ, māṭe for the Dative ; thī for the Ablative, no m., nī f., nu n. kənɛ for the genitive and maḥ bhaṇi, viṣe for Locative relations. There is another class of post-positions which are also adverbs and are used as independent words. Some of them are ūpər, nīcɛ, māthɛ, heṭhɛ, mārphat, lidhe, vāstɛ, sāthe, vinā, vəgar, lagī, sudhi, etc.

55. *Adverbs :*

These are strong and weak ; the strong ones show gender, number and case, and are declined like adjectives. Their various classifications are not attempted here : Examples : *Weak :* jyarɛ, tyārɛ, kẏārɛ, pəhor, hāl, həvɛ, kāl, āj, aghɛ, chete, jāṇɛ, rəkhɛ, ṭhīk, bhəlɛ, scintā, etc. *Strong :* ghənɔ m., -ī f., -u n.

Conjunctions :

Conjunctions like, enɛ, nɛ, tethi, tɔ, jɔ, etc., are used for joining two words, two phrases or two sentences, as in other languages, and do not require any special treatment.

56. *The Phrase :*

A phrase is a meaningful combination of words unable to form a sentence. There are four large classes of phrases in Gujarati: (1)The post-position-phrase or the phrase containing one or more post-positions coming after a noun: as ghar mã̃, ghar mã̃ thī, sārāthi, hath nc, o nī, o nũ̃, o nã̃, kʌrvã̃ mã̃ bolyā thi, mʌrtāthi, mərelā pəchī. This phrase functions as a noun or an adverb. (ii) The noun-phrase or the phrase in which there is either (*a*) a substantive or a noun qualified by an adjective which in its turn is or is not modified by an adverb or (*b*) in which there an adjective modified by an adverb : *e.g.*, sārɔ ghoṛɔ ; ghənɔ, sārɔ, ghoṛɔ ; ghənɔ sārɔ, etc. Strong adjectives agree in gender, number and case with the substantive, strong or weak, and the strong adverbs also agrees the substantive in gender, number and case whether the adjective or the substantive is strong or weak ; thus ghəṇɔ saras hāth, ghṇī uttam vāt, ghənũ̃ sārũ̃ chokrũ̃, bəhu saras loko. When the strong substantive has its Inst-Loc. form analytically made by adding -e to the oblique, the strong adjectives and the strong adverbs appear in the oblique, and not in the Inst. Loc. case : as ghənā sārā ghoṛā-e, but ghəṇɛ sārɛ ghoṛɛ : The post-position phrase ending in a strong post pos. often functions as an adj. and forms a part of the noun-phrase, agreeing in gender, number and case with the following noun : thus : māṇʌs nā hāth, ghoṛā, nī cāl, ghar mã̃ nã̃ chokrã̃, te nī copṛi etc. (iii) An adverb phrase is one which modifies a verb or an adjective. It is always indeclinable when it modifies a verb. But while modifying an adjective it is declinable if ending in a strong post-pos. Thus: ghʌṇũ̃, sāṛũ̃ kəryũ̃, ghʌṇu, jʌldi lʌkhyũ̃, indeclineable ; but declineable in pāṭh ghəṇɔ utāvlɛ, vācyɔ; najar ghəni nīcɛ nākhi. Many post-position phrases play the role of adverbs in Gujarati sentences. (iv) The verb-phrase consisting of (i) a verbal form + another verbal form of an auxiliary verb (ii) a participle + another participle of an auxiliary verb (iii) a participle + a verbal form of an auxiliary verb. These phrases have given to Gujarati language a vast collection of compound tenses capable of expressing different shades of time and aspect. The auxiliary verb is either 'chɛ' or 'hɔy' both meaning 'to be' or its participles. (1) The present continuous : principal verb + the auxiliary verb : kərɛ chɛ (2) The Intentional future : potential part. + the aux. verb in the present tense : kərvũ̃ chɛ ; (3) Future of Indefinite intention : potential part. + the aux. future : kʌrvũ̃ həśɛ. The participle of the principle verb + a participle of the auxiliary verb; (4) *The continuous past.* The pres. part + the pres. part. kʌrtɔ hətɔ ; (5) The past perfect : The past part. + the pres. part. kəryũ̃ hətũ̃ ; another form kərelũ̃ hatũ̃ ; (6) The participle + the verb : Fut. cont. : pres. part. + future tense : kʌrtɔ həśe ; (7) Past perf. : past. part. + pres. tense : kʌryũ̃ chɛ, another type kərecluũ̃ chɛ : (8) Future perfect, past. part. + future tense : kʌryũ̃ həśe, (9) Inten-

tional present : poten. part. + the present tense : kʌrũ chɛ ; (10) Intentional future. kʌrvũ həśe. The above varieties can be further multiplied.

The negative phrase nahĩ (the strong form) and na (the weak form) are the negative particles for indicative sentences, and mã (the strong form) and ma (the weak form) for the Imperative. The strong forms follow the predicate and the weak precede it., *e.g.*, e khavũ nəhĩ or e nʌkhavũ ; kar mã or mə kar ; hũ gayɔ nəhĩ, hũ nəgəyɔ ; āv mã, məāo, etc. The negative of chɛ is nathi which should replace chɛ in the negative sentences : as positive ā ghar marũ chɛ, neg. ā ghar mārū nəthi. It is wrong to say, ā ghar marũ chɛ nathi as some Deccanis say, though a sentence like, ā ghar marũ chɛ nəhi is tolerable.

The OI had a large number of verbs expressing various shades of action, but their number became smaller and smaller in the MI and by the time we reach the Mod.I. stage many of them showing fine shades and differences have fallen into disuse. Verbs of general and colourless actions such as karɛ, bolɛ, jāy have survived. The loss is made up by creating new verb-phrases consisting of two words in which the last member is a verb of general import and the first member is either a noun or an adjective connected with the verb or an infinitive-absolutive form of another verb : Thus : rāj kərɛ 'rules,' mām pāṛe, 'names' hāth āvɛ 'is found out', mār khāy 'is beaten'; mari gayɔ 'died.' Some of these general verbs are jā, cūk, nākh, paṛ, pār, sak, lɛ, dɛ, rhɛ āv, thā. It is interesting to note that these verbs of general import change their original meaning and are almost treated as auxiliary ones. They also modify the meaning of the preceding member in various ways : kəri nākh, lailɛ, jətɔ rhɛ, show quickness ; māri nākh- shows completion of the action ; ləkhyā kar shows continuity ; cāltɔ thā shows the beginning, etc. Such groups are, practically, the verbs and are conjugated like the final verbs in each group. We call them the verb-phrase or the composite verbs and they are to be distinguished from the compound tenses noted above.

57. *The Sentence :*

The sentence is a word or a group of words which predicate something about the subject expressed or understood. The subject is a noun *i.e.*, a substantive, a pronoun, an adjective or a numeral. The predicate is a verb or a participle, or a noun or their combination. When the sentence is a verb or a phrase containing a verb, it is called a *verbal sentence :* jhoṛɔ, khāy chɛ, bhāi jāy, hũ āvĩś. When the predicate is a noun or a participle, the sentence is called a *nominal sentence* but it expresses the various tenses quite correctly. Thus : hũ gəyɔ (past tense) ; te jətɔ (habitual past) ; nɔkʌr avelɔ (past, with expectancy incomplete) ; ghorɔ āvvt (conditional) ; təmārɛ jʌuũ (mild imperative) etc. When a substantive or an adjective comes as a predicate it shows simple predication : e khʌrũ marũ nām rān ; təmōri vāt sācī. All the verb phrases described above, when used as predicate, go to constitute a sentence chokrɔ, jətɔ, hətɔ. Agent nouns single or with an auxiliary verb or a participle are used as predicates to show future : hũ + mumbai jənār ; bhāi mari sāthe āvnār ; magʌn bolnār hətɔ ; kɔṇ, jamnār chɛ ?

58. *Agreement between the Subject and the Predicate :*

The verbal forms of the predicate require the subject in the direct case and the verbal form agrees with the subject in person and number : hũ jāũ chũ ; bāpu āvśe ; bhai jāy ; təmẽ bɐsɔ. When a participle is used as the predicate the general practice is to put the subject in the Direct case before active participles and in the Ins. case before the passive ones. The pres. act. and the pot-past. pass. part. have stuck to this old pratice, the former always requiring the Direct case and the latter the Inst. whether the verb is transitive or intransitive. Thus, the pres. part. ghoṛɔ doṛtɔ ; bhāi āvət ; pot. part. : mʌgnẽ paṭh vãcyɔ, bhaie āvəvũ. But there is considerable discrepancy when the past. pass part. is used. Generally speaking the past part. of the transitive verbs requires the actual doer or the agent in the Inst. and the object in the Direct case ; thus, mẽ rotlɔ khādhɔ ; magnẽ niśaḷ joi. In the case of past. participles of intransitive verbs, the passive sense having been worn out, the participle is for all practical purposes is treated as active and the actual doer of the action is put in the Direct case instead of in the Inst. : mʌgan rəmyɔ ; gāy āvī ; chokrɔ bolyɔ. The predicate in all the above cases agrees in gend., number and case with the subject in the Direct case. But a few complications due to further development and psychological contamination have however taken place in the transitive verbs. It is an OI practice that when the speaker does not want to bring out the transitive nature of a verb by using a noun in the accusative case, he simply uses the tr. verb intransitively, *i.e.*, omits the object. This practice gathered a momentum in some transitive verbs to such an extent that they became practically intransitive verbs. Many verbs of this class reverted to the practice of the Intr. verbs, *i.e.*, they required the agent in the Direct case in the past-part. construction, though strictly speaking they ought to require the agent in the Inst. Thus the verb jʌm- 'to dine' has hũ jəmyɔ. not mẽ jəmyũ although the verb khā- 'to eat', has m-ɐ khādhũ.

With reference to the transitive verbs which require the agent in the Inst. case, the practice of using the object in the Direct case is again not uniform. A large number of such verbs require the object in the Direct case and the participle predicate agrees with it in gender, number and case ; thus mẽ roṭlī khādhī, mẽ rotlɔ khadhɔ, mẽ naṭak joyũ. But when the verb has two objects or when a different shade of sense is to be expressed by the participle, the object is followed by the post pos. nẽ. If there are two objects, one appears in the Direct and the other before nẽ. Even in cases where there is only one object, the post. nẽ is used before it to show another sense, thus : corẽ bai mārī 'the thief killed the woman' but corẽ bāi nẽ māri 'the thief beat-the woman' or corẽ bai nẽ māryũ 'the thief beat the woman ' or again corẽ bia nẽ lākṛi, ḍanḍɔ, lākrũ māri, māryɔ, māryũ. So also one can say chokrɐ citra joyⁿ as also chokrɐ citra nẽ joyũ, with a slight change in sense.

Coming to the use of genuine MG passive verbs and MG passive participles, they require the noun expressing the agent in a phrase before the post pos. thī : *e.g.*, chokrā thi kām kərayũ, pāṭh vancāyɔ, copṛi jovai. The object here, as in the case of some participles noted above appears in the Direct and the predicate which is a passive verb or a new pass. part. agrees with the object in person, gender, number and case as the case may be.

There is a third variety of construction in which the old or new passive participle or the transitive or the intransitive verb in the passive voice is used without expressing the object at all. In such a case, the verbal form having no word in the sentence to agree with appears in the 3rd sg. and the participle in the Dr. sg. n., *e.g.*, mʌgnɛ̃ khādhũ̃, tenāthi bolayũ̃, mārāthi cəlātũ̃, dosāthi həve jovātũ̃ nʌthī. In Indian grammars these 3 constructions are called the three *prayogas*. They can be defined as follows: (1) when a verb or a participle used as a verb agrees in person, number, gender and case with the noun expressing the actual doer of the action which is put in the Direct case, we call it as the Kartari Prayoga of the predicate. (2) When the verb on the other hand agrees in person and number and the participle in number, gender and case with the object of the verb which is placed in the direct case or in rare instances in a post-positional phrase ending in nɛ̃̄, while the noun expressing the doer is not placed in the Direct case, we have the Karmaṇi Prayoga of the predicate. (3) When the object of the verb is not expressed at all and the agent is also not placed in the Direct, *i.e.*, when there is no noun in the Direct case in the whole sentence, the predicate verb takes 3rd per. sg. and the participle takes the Dir. sg. n. form. This use of the predicate is called the Bhavɛ̃ Prayoga. Illustrations are given above.

59. *Compound and Complex Sentences:*

Compound and Complex sentences are constructed in Gujarati in the same way as they are done in other Indo-Aryan languages by using co-ordinating and subordinating conjunctions and pronouns: *e.g.*, comp.: chokrɔ āvyɔ ənɛ̃ gəyɔ; complex: je chokrɔ avyɔ te gəyɔ; mixed: je chokrɔ āvyɔ te jəmyɔ ənɛ̃ gəyɔ, etc. They, therefore, do not call for any remarks.

THE DIALECTS OF GUJARAT

60. *General:*

Practically no research work has been done in connection with the Dialects of Gujarat. Sir George has remarked, perhaps on the superficial information made available to him by his informants, that Gujarati has practically no dialects. In his linguistic survey, he has given a few examples of the forms of speech spoken in North, Central and South Gujarat and a specimen from Kathiawar. He has also noted a few but salient peculiarities of these forms of speech. As a matter of fact on deeper investigation, we find that Gujarati is singularly fortunate in having a very large number of dialects. These dialects are (*a*) Regional, that is, confined to different particular areas and spoken by almost all men of the area in a comparatively uniform manner; there are also (*b*) the Tribal dialects or the special dialects spoken by certain tribes and communities who came from outside and settled here, but who did not entirely give up their old language. Gujarat, we know, has given shelter to an unusually large number of such tribes from outside. Speaking from the Regional point of view, Gujarat splits up into two natural parts, the Peninsular Gujarat or Saurashtra or Kathiawar and the Gujarat on the main land of India. The main land, being longer north-south than east-west splits up into 3 natural divisions: North

Gujarat reaching as far as Ahmedabad district to the South and called Gujarat proper; Central Gujarat called Carotar reaching as far as a few miles south of Baroda and South Gujarat including Surat and Broach Districts. The Central portion, Carotar, in the eastern side called Panch-Mahals shows a difference in language and should be considered as an area speaking a dialect of Standard Carotari. Saurashtra divides itself regionally into Jhalawar, Gohelwar, Halar, Sorath and Okhamanral.

61. *Main Dialects:*

The language of *North Gujarat* shows unmistakable influence of Marwari. The fact is perhaps that an old form of the language of this area was overlaid by another one having more resemblance with Marwari. Relations of North Gujarat and its capital Pāṭan with Rajasthan in the Middle Ages were very close and lasted upto the time when OG was already a spoken language. *The Central area, Carotar,* is easily distinguishable from the North and the South areas. The language of this area shows a large influence of aboriginal speech. In old times the inhabitants of Carotar had perhaps very close relations with Bhils and other aboriginal tribes; Carotari dialect is therefore highly saturated with the elements of aboriginal speech. The affricate pronunciation of palatals sounds, the use of 1st pers. of the verb for the 2nd and the non-Aryan pronunciation of h, prove the highly influenced nature of Charotari. The story of the *South* is quite different. The country south of Narbudda was Konkan and a form of language akin to old Maharashtri was spoken there. Gujarati has reclaimed it comparatively recently. The language of this part, therefore, shows close similarity with the Konkṇi dialect of Marathi noteably in the cerebral pronunciation of dental sounds, etc., the characteristics of the dialect of Sopara, the capital of Konkan for a long time noted as early as the time of Aśoka. The oldest form of Gujarati language is perhaps to be found in *Kathiawar.* Being a peninsula and approachable by land through only one route, the language of Kathiawar has preserved many old forms: the 2nd sg. pres. in Kathiawar does not end in a termination—which is a late innovation but in the radical vowel or consonant; *e.g.*, tũ kar, tũ khē, lũ jo where St. Guj. has tũ kərɛ, tũ khāy, tũ jue, etc. The distinction between Inst. and Loc. forms of nouns is still observed in Kathiawar by nazalizing the inst. form: *e.g.*, hāthẽ 'with a hand' and hathe 'in the hand.' In Kathiawar itself, perhaps the oldest form of language is found in *Sorath,* which supplies the earliest evidence of Aryan settlements and consequently the erliest existence of Aryan speech in the area. The famous temple of Somnath, the burial place of Kriṣna, called dehotsarg near Veraval, the edicts of Aśoka, Rudradaman and others at Girnar, the Buddhistic caves in sāṇā dungar, the Uparkot of Junagadh are too well-known to the student of Indian history. Moreover, the influence of foreign invasions and foreign rule has been at its minimum here on account of its great distance from Viramgam District, the gateway of Kathiawar. The Mahommedan rule in Junagadha has not affected the language of the masses. The next linguistically important area in Kathiawar is *Gohelwar,* the area of old Vallabhipur, of the famous Jain temples at Palitana and the place of early settlement of Brahmins at Śihore.

Okhamandal comes next in importance from the linguistic point of view. This small desert-like patch of land has an old form of language uninfluenced by education. Being the place where the famous Dwarka temple is situated, it has preserved many old customs and forms of speech. It should be noted that modern research doubts the location of original Dwarka in this area and is inclined to put it near Verawal in Sorath. *In Halar*, the old language is overlaid by a form imported from Kacch called the Jaṛeji dialect, when the Jāṛejās of Jamnagar, Gondal Dhrol, Rajkot, etc.—all in one group occupied Halar. The accent, the intonation and the phrasing of this dialect is so obviously different from those of the rest of Kathiawar that this dialect can be most esily detected from among the group of the dialects of Kathiawar. The *Jhalwari* dialect represents a stage in which one form is overlaid with another having some similarities with the language of Thar and Parkar. The Jhalas came to Kathiawar by that route ; only two centuries ago Paṭri, Jhinjhuwara, and a portion Chũval were under Dhrangadra, the centre of Jhala culture in Kathiawar. Besides these five regional dialects, there are some dialect-islands or small areas of old forms of speech scattered here and there not overlaid by subsequent forms of speech. They are *Babariawar* and Sarvaiāwāṛ or the lands of Bābars and Sarviās respectively. The language of Barbaras and Sarvains have assumed the local character here. Their characteristics are not studied by any one as yet.

62. *Some Characteristics of the above dialects are noted below :*

Kathiawadi in general : The vocal group -āi is contracted to -ai : SMG bhāi=Kath. bhai ; SMG khāi=Kath. khai. The consonantal shift : a gutteral consonant +i or y=the corresponding palatal vowel+i or y : SMG kaki=Kath kācī ; SMG khiskoli=Kath Chiskoli ; SMG gīyɔ=Kath jiyɔ ; SMG ghea=Kath : jhee ; ete.

The quolloquial Loc.-Inst. palatalizes the ending consonant : thus SMG hāth āvyɔ 'was found out '=Kath hāth, ā-vyɔ ; SMG gām gāyɔ 'went abroad '=Kath gām, jiyɔ.

The old palatal c and ch=s ordinarily but=ś if followed by i or y except in Halari: Thus : SMG cor=Kath sor ; SMG cīrə=Kath śīre ; SMG chās'=kath sās ; SMG chībũ =kath śību, SMG che=kath. sɛ. The auxiliary verb 'to be' appears always a s's' instead of 'ch ' : SMG māreche—Kath marɛ sɛ etc.

S appears as h (unvoiced) : SMG sãsā=Kath hãhā ; SMG sāt=Kath hāt ; SMG das—Kath dah. Preservation of ś : SMG and Kath sāk ; SMG and Kath śũ, etc. The Middle Indian -h- is elided. This is a very prominent characteristic of Kathiawari : SMG vahu=Kath vau ; SMG rəhɛ=Kath rɛ ; SMG kəhɛ=Kath kɛ ; some grammatical peculiarities are also noteworthy. Kath. has the dem. pron. ī instead of e, and forms like īnɔ, īyã, īm instead of e-no 'his ', tyã 'there' and ɛm 'in that way,' etc. The plural of nouns end in ũ, which is an old feature : bāi 'a woman', baiũ 'women ' ; maṇas, manhũ, In conjugation, unlike the standard Gujarati the 2nd pers. sing. differs from the 3rd pers. sing. : thus 2nd sing. tũ māra-s—SMG tũ mārɛ chɛ but 3rd sg. te mārɛ-sɛ. The 1st pl. pres. of 'to be ' is saiyẽ instead of SMG chīe : *e.g.* əmẽ Kathiāwari saiẽ. The Imperative 2nd pers. sing. is identical with the

pres. 2nd sing. and in both cases the ending radical consonant is palatalized, as, lʌkh̤ 'write' or 'thou write.' The old passive suffix in -aṇɔ is in fuller use in Kath. than on the mainland: Kath bhrāṇɔ=Guj. bhrāyɔ. This is a very outstanding characteristic of Kathiawari, and the inhabitants of Gujarat proper detect immediately the Kathīawari language from this pass. part. Some strong verbs appear in strong form in Kath: Kath jā-vũ=SMG jəvũ 'to go,' Kath thāvũ=Guj. thəvũ 'to be.' Coming, next, to the dialects in Kathiawar, Jhalawari has some peculiarities: special words: cam 'why'; kīdhũ (instead of SMG kəhyũ) 'told', jhāli jāy=SMG pəkṛi jāɔ, Kath īm nī im=SMG tem nī tem 'just in the same condition'; ād 'deep part of the lake;' Jhal. olyɔ=SMG pelɔ 'that'; Jhal. gadrɔ=SMG gārɔ; Jhal. rāv khāvi=SMG phariyad kārvī 'to complain'; Jhal. bheṭ bhetiā̃ 'close to each other'; Jhal. rolũ=SMG lərai 'a fight.' Jhal. soṛi=SMG chokri, sorthi sokri; Jhal. vətāvi=SMG bətavi 'showed' etc.

Halari has ũā=SMG tyā̃; kāi=SMG kəi; taəiyɛ̃=SMG tyārɛ; Tha Halari speaker often uses the word bhəlā 'o, good man'. In short intervals in the sentence, The Halari converts every ś to s: SMG śũ=Hal. sũ; even the future forms have s, not ś: khāsũ sũ 'what shall we eat?'

The sorṭhi dialect has the smallest number of lws from any other language including Sanskrit, Urdu, Hindi, Persian and European languages.

The Gohilwaṛi changes ś to h: SMG śāk=Goh. hāk; SMG śihor=Goh. hyɔr; SMG śī khəbar 'I do not know'=Goh. hī khəbar. The vocabulary is also different: for SMG paiśɔ, Goh. has phʌdiyũ; also note, Jhal. jai, Hal paisɔ; Sorth kāvəṛiyũ. It is not possible to deal with these dialects in detail just now as they are still in unexplored condition; but the characteristics noted above will, it is hoped, suffice for the present.

63. Coming to the Mainland of Gujarat, we take the *North Gujarat or Pattani* first. The dialect of the northern most part near Palanpur is saturated with Marwari, but the Pattani or Cũvali or Gujarati proper (which is its old name) is also not free from that influence. Here also the vocalic group āi is contracted into ai as in Kathiawadi: SMG bhāi = NG bhai. ā + a nazal vowel or a nazal consonant = ɔ̃ + the nazal sound: thus SMG cādɔ = NG cɔ̃dɔ; SMG māḍe = NG mɔ̃ḍe. The SMG long ī = NG ɛ under the same circumstances: SMG vīṭi = NG vɛṭi; SMG nīce = NG nɛse. The final nazalization tends to disappear. We have to note that it is strong in Kathiawar: SMG kəryũ = NG kəryu; SMG bairā̃ = NG bairā. The SMG e, ch = NG s, in common with Kathiawari: SMG ūcɔ = NG ɔ̃sɔ; SMG kharcī = NG kharsi (kath. kʌrśi). The gutteral kh + a palatal vowel = palatal ch + the vowel: SMG khetar = NG chetar; so also SMG g = NG j: SMG lāgyɔ = NG lājyɔ. The tendency to replace l̤ by r: SMG sʌghl̤ũ = NG saghrũ; SMG āgəl̤ = NG āgər; SMG dhɔl̤ɔ̃ = NG dhɔrɔ. In grammar, the inst. loc. form ends in -i, not in -e as in SMG: thus SMG hāthe = NG hāthī. The prons. mī, tī are used for əmī, təmī. SMG me, te, əme, təme, etc. The 2nd pers. sing. pres. ends in -ā̃ and is different from the 3rd sing.: as mārə sɔ̃ = SMG mare che ('thou beatest)'; in future the -ś- is sometimes replaced by -h- unvoiced as SMG mārśe = NG mārhe. This is due to Marwadi influence.

64. *The Charotari dialect* has peculiar palatal sounds; the SMG c, ch, j and jh being affricated to ts, tsh, dz, dzh, (written as c, ch, j, jh). ch is pronounced as s in the verb 'to be.' Char. vetsī = SMG v-ecī; char-tshokrɔ = SMG chokrɔ; Char. dzʌɽyc = SMG jəɽyɔ; SMG che = Char. tse; SMG ch = Char. tsɔ. The gutteral k and kh followed by a palatal vowel become c and ch respectively; SMG keṭlā = char. ceṭlā; SMG dīkrɔ = Char. dīcrɔ; SMG nākhvũt = Char. nɔ̃ ch vũ; SMG khetar = Char. chetar. The OI s becomes h (unvoiced). SMG sārũ = Char. hārũ; SMG sāmɔ = Char. hāmɔ; SMG sāsā = Char. hāhā. In gram. the post-position thi is pronounced as śi: khuśi śī = SMG khuśīthi 'with pleasure.' In the verbs, the 2nd pers. sg. pres. is modelled on the first person: thus mārũ sũ is 1st and 2nd pers. sing. In compound verbs, the auxiliary che is often shortened to ch: as SMG māreche = Char. māre ch. In future, the 1st and 2nd pers. sing. show -e- before the sign ś: māre-ś. This is a very old form. The use of prop-words like kəne (lit. is it not) is a feature of this dialect.

65. *The Surti dialect:* In this dialect, the SMG ś and SMG s = Surti h: SMG das = Surti dah; SMG maṇas = Surti māṇah; SMG sārɔ = Surti harɔ; SMG śũ = Surti hũ, SMG śāk = Surti hāk.

The original initial h is lost: SMG hũ = Surti ũ; SMG həṭɔ = Surti ūṭɔ; SMG kəhũ = Surti kʌũ. In the dropping of intervocalic -h- it resembles Kathiawari.

A large scale confusion of cerebral and dental stops as well as nazals more in favour of cerebrals is an outstanding characteristic of this dialect: SMG t = Sur. ṭ: SMG təme = Surti ṭəme; SMG taṅgī = Sur. ṭaṅg; SMG th = Sur. ṭh: SMG thoɽā = Sur. ṭhoḍā; SMG ekṭhũ = Sur. ekṭhũ; SMG d = Sur. ḍ.: SMG dəhāɽɔ = Sur. ḍəhāḍɔ; SMG dh = Sur. ḍh: SMG didhũ = Sur. ḍiḍhũ.—The SMG -ṇ- = Surti n: SMG kāraṇ = Sur. kāran.—SMG -ḷ- = Sur. -l-: SMG gəḷe = Sur. gəle. Confusion between n and l: SMG n = Sur. l: SMG nākhe = Sur. lākhe. The tendency to double single consonants for the sake of emphasis: SMG nokar: Sur. nokkar.—Melathesis of the group, cons. +y, yielding the group, y+the cons. with a vowel glide after y. Thus: SMG māryɔ = Sur. māyərɔ; SMG pāryɔ = Sur. pāyərs; SMG. cālyɔ = Sur. cayəlɔ; SMG poriyɔ or poryɔ = Sur. poyərɔ.—In the conjugation, the decay of the final vowel of the auxiliary verb che is more marked here than anywhere else. Thus the aux. chũ, che, chie become ch: The forms becomes ũ mārũ ch; tũ māre ch, te mare ch; hame mārie ch; tame marɔ ch, te mare ch.—The future changes its ś to h (unvoiced) regularly. The forms become mārih, mārhũ, mārhe, mārhɔ. The future is occasionally shown by the intentional potential form; thus: ũ javā or jāvānɔ.—The dialect of eastern Broach and Panchmahals show a large mixture of Bhili elements; otherwise they are of Surti and Carotari forms respectively.

A special characteristic of the Surti dialect is that it forms its continuous present very often from the pres. part. of the principal verb followed by the pres. forms of 'to be' chũ. This is quite different from the practice of Gujarati language, *e.g.*, hũ kʌrtɔ chũ. Surti = SMG. hũ kərũchũ.

The language of Baroda City and the surrounding villages shows the influence of Marathi in vocabulary, intonation and sentence construction. But it does not deserve to be called a separate dialect on that score.

The Bombay Gujarati is a mixture of so many Gujarati dialects and other sister Indo-Aryan languages particularly Marathi and Kucchi. Some expressions having distinct Marathi ring often occur in this speech : *e.g.*, bār gām ; garaj lāgī, etc.

66. *Special Dialects :*

We shall now say a few words in connection with the special dialects or the dialects used by classes of people. The *Gujarati literary* language as seen in the works of well-known modern writers is a variety which, as a literary language, should be considered as a special language, used by a special—though highly educated—class of people. It is characterised by a mixture of many dialects, new and old, highly saturated with learned loan-words from Sanskrit, Persian and Arabic, and to a certain extent artificial (though artistic at the same time). As is natural with literary languages, it is not meant for daily intercourse. It is based on the *standard form of Gujarati.*

We next come to the *language of the Parsis.* Gujarati is the mother tongue of this community, but on account of long segregation and want of free intercourse with the other people of Gujarat, it has preserved some very old traits of OG. The past participle, for example, in Parsi ends in -iyɔ, which was the case in the MOG of 17th and 18th centuries. Moreover, when the Parsis came to Gujarat they had to adopt Gujarati language as the mother tongue. Gujarati was, therefore, superimposed on their original Persian language. This Persian as well as their religious Avestic language has no cerebrals. The influence of the substratum language is still observed in their inability to pronounce cerebrals, though they first learnt the old Surti from Gujarati language which had a partiality for cerebral sounds. The Parsis even now produce true dentals in place of Gujarati cerebrals or English alveolars. They also show preference for r and l sounds to ṛ and ḷ which is also explicable on the same theory : thus : SMG pəṛyɔ=Parsi pʌṛiyɔ ; SMG āgəḷ=Parsi āgəl ; SMG pəṇ=Parsi pʌn ; SMG ḍukkar=Parsi dukkar. They preserve the OI s OG s and h, not changing them to -h- (unvoiced) or s respectively as the other Guj. dialects do. They have some special pronunciation (forms : tewan nom. pl. 3rd per., teṇi f.) ; In conjugation they follow the Surti way of omiting the last vowel of the auxiliary verb che, chũ, chie, etc., all of which are changed to ch. The ś of the future become s not h. The Parsis pronounce the nasals very distinctly, quite unlike their Hindu brethren. The conditional form hote, kʌrte, etc., in stead of SMG hot, kʌrat, etc., are common in Parsi newspapers.

67. *The Dialects of the Mohammadans :*

Mohammadans are scattered all over Gujarat, but they are in large collections in places like Ahmedabad, Surat, Junagadh, etc. on historical grounds. Among them there are different groups. (*a*) *The cultivators called Momnas* live in villages and till the soil. They are in large number in Broach District and round about, and in Macchu Kāntha in Kathiawar. Their language is the same as the local language or the language of the district in which they stay. They never speak Urdu or Hindustani; their manners and customs are mainly Hindu ; they have an

officiating priest who comes every year for the recovery of religious cess and at that time they get an opportunity of hearing their scripture explained to them in Gujarati-Urdu lauguage. (*b*) Of the *merchant Mahomedans* some reside in villages and carry on home-industries like oil-mills, making tin vessels, and are called Ghānchis, Khojas Dhobis, Barbers, etc. They speak the language of their district. They are scattered all over the rural area of Gujrat. But they visit their religious places more often and understand Urdu or Hindustani though they do not speak it in their homes. In religion, *Khojas* are different from others. Of those who live in towns and cities and who serve in the British Government or native States in Police and Military, the class called Sapais form a majority. They speak a form of *broken Urdu* in their houses, but also broken Gujarati outside. As a matter of fact, they are neither masters of Gujarati nor of Urdu. Among them education is less and hence they are unable to enjoy the high literary beauties of Gujarati or of Urdu. But the nobler classes Saiyads, Kadris, etc., are highly educated and cultured people. Their children learn Urdu from childhood and in their homes they speak eloquent Urdu or Hindustani language. Their manners and customs are refined and resemble those of the cultured classes of Upper India. They also speak good Gujarati but their Gujarati is mixed with Urdu words and often contaminated with Urdu grammatical and idiomatic bias.

Next we come to those Mohammadan communities who speak special Gujarati dialects. They are the *Borahs* and the *Memons*. The Bohras were Brahmins who embraced Islam under the influence of the Arabs. Their centres are Siddhpur in North Gujarat and Surat in the South. They are also in large number in Kathiawar. The Bohras never spoke Urdu or Hindustani ; they have always spoken Gujarati in the past. But being segregated from other Hindus socially and in religion, their social circle became too narrow and the language fossilized. Their preference for r, l and dental sounds often to the exclusion of ṛ, ḷ and cerebrals, small vocabulary and limited idioms indicate the stereotyped nature of their language. There is no literature in the Bohra dialect.

The *Memons* speak a form of Kacchi highly mixed with Gujarati in their homes and among themselves ; with others they speak Gujarati with Kacchi accent. This community belongs to Kathiawar, although now they are found all over the world. Their language is the same as that of the Hindu Bhatias who also trace their origin from Kucch. There is a close relation between the manners and customs of the Bhatias and the Memons. There is a theory which states that Memons are the Bhatias converted to Islam. In Kathiawar, they came from Cutch. They have two centres in Kathiawar, one in Halar near Baḷambha, Joṛia, etc., and another in central Kathiawar at Jetpur, Dhoraji. Some of them are very well-to-do people and spend large sums of money in charities. The language of Halai Memons is in a purer form and shows less mixture of Gujarati idiom than that of the Memons of Central Kathiawar.

Similar to the dialect of the Memons but differing from it in many respects is the language of Mianas, a criminal tribe of Malia in Macchukanṭha. The *Miaṇas* came from Sind or Thar Parkar and settled in Macchukanṭha ; nowadays, their only strong-

hold is Malia. Their special language helps them in their profession of robbery and theft, as they can easily talk with their companions without being understood by others. They have therefore carefully preserved their language and are not willing to part with it.

68. Coming to the *Hindu Communities*, there are the *Kaṭhis* in Kaṭhiawar. They have two centres. The original place of settlement called Kaṭhiawar proper including Chotila, Anandpur, Jasdan, Paliad, etc.; and Vāḷāk or the country of Vāḷās —a Kāthi sect. This portion is in Sarath and embraces Jetpur, Bilkhu, Bagasra, Vaṛia, etc. The Kaṭhi culture is quite different from the Rajput culture. The Kaṭhis are more democratic in social and personal relations, their customs their names, etc. are quite different from those of the Rajputs. Their hospitality is proverbial. Their language is characterised by special words like bhʌnyũ, āpā, etc., their pronunciation of ḷ is ultra retroflax and that sound often replaces the SG r: *e.g.* SMG marũ = Kathi mūḷũ; SMG tarũ = Kath tɔḷũ, etc. There is some oral popular literature prepared by their bards in the Kaṭhi dialects, eulogizing the heroic exploits and philanthropy of the Kathi durbars; most of the Kathiawari loka-sāhitya is found in this dialect.

69. The language of *Mers* is a distinct form of speech. These mers are supposed to be the successors of ancient *Maitreyakas*. They live in Barda Hills near Porbunder, are a very small in number but a strong and heroic tribe. They have some literature in their language. Just now they are leading a pastoral and agricultural life in the Hills.

The *Sailors of Kathiawar* and Gujarat speak a form of language call Kharvi which is unintelligible to an ordinary Gujarati. There are large settlements of the Kharvas or professional sailors in Porbunder, Verawal, Jafarabad, Tuṇa, Mandvi, Surat, Broach and Cambay. Their language has a mixed vocabulary, mutilated out of recognition, but the Grammar is Gujarati. In sound-changes, the Surti dialect has affected it very much. The confusion of cerebrals and dentals, of l and n or r and ṛ and doubling of single consonants are the characteristic features of this dialect also. They form their future by adding s which in SMG appears as ś and in Surti as h.

70. Sir George has given Nagari or the *Dialect of Nagir Brahmins*, *Bhaṭheli* or the Dialect of Anand Brahmins, *Paṭidari* or the Dialect of Patidars of Charotar, and *Gamadia* of Ahmedabad district, as separate dialects but they do not deserve to be considered as such. It is true the Nagars of Gujarat are a highly civilized and cultured community and their language was easily distinguishable from those of other classes some 50 years ago when education was a previleged for the few. But owing to the expansion of education and the consequent levelling out of the Dialects, the language of the Nagirs has become indistinguishable in many respects from the standard form of Gujarati. However, there are some turns of speech and idiomatic expressions, specially found in the language of Nagirs which point to their cultural superiority in Gujarat. It is said that the very Apabhramśa, the Nāgara Apabhramśa, from which OG has directly come, was cultivated to perfection by the Nāgars. On the same ground, we dispose of the Bhaṭhali and the Paṭidari, the former shows

the peculiarities of Surti and the latter of Carotari. The Gamdia of Ahmedabad is not different from the speech of North Gujarat; but Ahmedabad being the southernmost end of North Gujarat, and a cosmopolitan City, the language of villages round about Ahmedabad presents some characteristics of a mixed language. We need not count that speech as a special dialect, on that score.

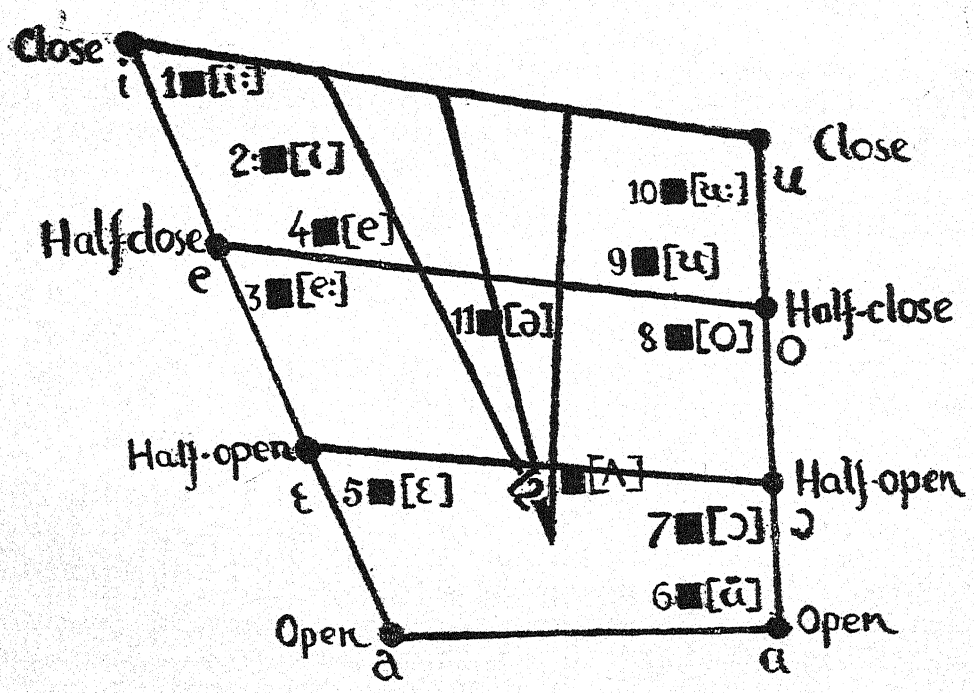
71. Sir George has also given *Patanūti*, the language of silk weavers of the Deccan and Madras, Kākari the language of some Paṭhans in U.P., the Punjab and Hyderabad, and Tavīmūkī or Ghijādī, the language of wondering tinkers of Berar and Maharaṣtra, as forms of Gujarati language. From the specimens adduced by him they appear to be such, but a deeper study and more material is necessary to enable us to say something more about them.

72. *Dialects of the Borderland:*

Finally, there are the dialects on the borderlands of Gujarat. We know that Gujarat has a sea border and a land-border. On account of large commercial activity in the ports of Gujarat beginning from very early times down to our own age, the language of ports was very much influenced initially, as a result of which a more or less uniform language has come to be spoken in the principal ports of Gujarat, such as Mandvi, Mundra, Okha, Salaya, Porbunder, Verawal, Diu, Gogo, Bhavnagar, Cambay, Broach and Surat. The sailor tribes of these towns are the citizens of the world and their language is aïso of a more or less uniform nature. On the land frontier, Gujarati shows influence of the various neighbouring languages with which it comes in contact. If the neighbouring language happens to be a closely related language, both fuse imperceptibly into a new form of dialect. If, on the other hand, it is not quite akin to Gujarati, their meeting brings about a mechanical mixture without any fusion. Sindhi in the North and Marathi in the South are the only languages which being totally of different stocks mix mechanically with Gujarati. In all other cases, Gujarati merges with cognate and closely related languages. In the north the mixture is represented by the language of Thar and Parkar dialects reaching as far as and perhaps going a few miles beyond Miṭṭhi in Sind. This dialect shows a mixture of Sindhi, Cutchi, Marwari and Gujarati, words and phrases. The language near Damman in the South presents the same kind of mixture of Gujarati and Marathi. Coming to the area where as a result of fusing new dialects have developed, we mention, starting from the north, a small borderland area between Palanpur, with Therad on one hand and Shirohi, Danta and Jodhpur on the other. These dialects present the characteristics of both in a state of fusion. Next we come to a large patch of Bhili languages hemmed in between the Gujarati language of Mahikantha, Panch Mahals, and Rewakaṉtha on the Gujarat side and the dialects of East Mārwar, Mewar and Malwa on the other. The Bhili dialects are the result of the fusion of Guj. and the Rajasthani languages. The Bhili dialects are more akin to Guj. because the Guj. influence is more predominating in the area than Rajasthani. Further south comes Khandeshi, which though a part of Malvi, separated from it rather earlier and now under the influence of Marathi has striking resemblance with Gujarati which mixing with it produces a curious mixture from the specimens of which it is difficult to decide its exact nature.

APPENDIX I

VOWELS IN GUJARATI



Note :—Positions of Gujarati vowels are indicated by square dots; their phonetic symbols are put in rectangular brackets, thus, [ ]; and they are given their serial numbers. The round dots represent the positions of the Cardinal Vowels; their names are symbols are given along with them.

સત્તરમા શતકની ગૂજરાતી ચિત્રકલા

પ્રો. કાન્તિલાલ બ. વ્યાસ

૧

પ્રાચીન અને મધ્યકાલીન ભારતવર્ષમાં ગૂજરાતનું કલાકારીગરીમાં અને વિશેષતઃ ચિત્રકલામાં ઘણું ઊંચું સ્થાન હતું, એમ તામિલ કવિતા મણિમેખલઇ,[૧] સોમદેવના કથાસરિત્સાગર[૨] અને તિબ્બતી ઇતિહાસકાર તારાનાથ[૩] વગેરેના ઉલ્લેખો ઉપરથી અને બાઘની ગુફાઓનાં દાંડિયારાસ જેવા ગૂજરાતના લાક્ષણિક જીવનપ્રસંગ આલેખતા ભિત્તિચિત્ર[૪] ઉપરથી જણાય છે. મધ્યકાલીન ગૂજરાતી ચિત્રકલાનાં વિશિષ્ટ લક્ષણો–અર્ધથી અધિક પાર્શ્વદર્શન (three-forths profile), બીજી બાજુ મુખરેખામાંથી બહાર ઉપસતી આંખ, લાંબું અણીદાર (pointed) નાક ઇ૦–ઇલોરાની આઠમા શતકની ગુફાઓનાં ભિત્તિચિત્રોમાં પણ નજરે પડે છે. એ ઉપરથી અજંતાઇલોરાનાં ભિત્તિચિત્રો ઉપરથી ગૂજરાતની ચિત્રકલાની ઉત્પત્તિ થયેલી મનાય છે.

ગૂજરાતી ચિત્રકલાનો ઉદ્‌ગમ ઇ. સ. ૧૧૦૦ થી થયેલો જણાય છે. આ સમયમાં ભિત્તિચિત્રોનો યુગ પૂરો થઇ હસ્તપ્રતોનાં લઘુચિત્રો (miniatures) નો યુગ આરંભાય છે. ગૂજરાતી લઘુચિત્રો ઇ. સ. ૧૪૦૦ સુધી તાડપત્ર ઉપર, ૪અ અને પછી ઇ. સ. ૧૬૫૦ સુધી કાગળ ઉપર આલેખાયાં છે. ઇ. સ. ૧૬૫૦ પછી ગૂજરાતી ચિત્રકલા રાજપૂત ચિત્રકલામાં મળી જાય છે. ગૂજરાતી લઘુચિત્રો બહુધા કલ્પસૂત્ર અને કાલકાચાર્યકથાના સુશોભનરૂપે પ્રાપ્ત થાય છે, જો કે થોડાંક વૈષ્ણવ અને શાક્ત ગ્રંથોનાં લઘુચિત્રો પણ મળે છે.

જૈન ગ્રંથોમાં લઘુચિત્રો અતિ વિપુલ પ્રમાણમાં ઉપલબ્ધ થવાથી આરંભમાં કલામીમાંસકોએ આ કલાને 'જૈન ચિત્રકલા' તરીકે ઓળખાવી હતી. ડૉ૦ કુમારસ્વામીએ[૫] આરંભમાં

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૧ જુઓ **Manimekhalai,** of Śittalai Śāttanār, trans. Krishnaswamy Aiyangar. p. 159.

૨ તરંગ ૭૪, શ્લોક ૧૩૮–૧૩૯.

૩ N. C. Mehta, **Studies in Indian Painting,** p. 22.

૪ **Bagh Caves,** 1927, **Plates** D & E.

૪અ અત્યારસુધીમાં મળેલાં તાડપત્ર ઉપરનાં લઘુચિત્રોમાં પાટણમાં સંઘવી પાડાના ભંડારનું નિશીથચૂર્ણિની પ્રતનું (વિ. સં. ૧૧૫૭) ચિત્ર સૌથી જૂનું છે.

૫. **Rajput Painting** Vol I, pp 1,2 and 5. નોંધ–પ્રસિદ્ધ જૈનચિત્રકલાસંગ્રાહક શ્રી. સારાભાઇ નવાબ આ કલાને 'જૈનાશ્રિત કલા' કહે છે. એમાં તાત્ત્વિક દૃષ્ટિએ કશું અજુગતું નથી, જો કે આશ્રયદાતાના નામ કરતાં ઉદ્‌ગમસ્થાનના નામથી કલાને ઓળખાવવી એ વધારે શાસ્ત્રીય ગણાય.

એને 'જૈન સાંપ્રદાયિક કલા' કહી, અને પ્રો. નોર્મન બ્રાઉને એને પ્રથમ 'શ્વેતાંબર જૈન કલા'નું નામ આપ્યું, પણ પછી એમાં અવ્યાપ્તિદોષ જણાતાં એને 'પશ્ચિમ ભારતીય ચિત્રકલા' કહી,[૬] જે અભિધાન શ્રી. રવિશંકર રાવળ જેવા ગૂજરાતી કલાચાર્યોએ સ્વીકાર્યું છે.

જાણીતા ગૂજરાતી કલામીમાંસક શ્રી. નાનાલાલ ચમનલાલ મહેતાએ પ્રથમવાર આ ચિત્રકલા ગૂજરાતી હોવાનું પ્રતિપાદન કર્યું.[૭] એમના મંતવ્ય પ્રમાણે લોકકલાની જે પરંપરા પશ્ચિમ ભારતમાં ૧૧મી સદીથી પ્રચલિત હતી તેમાંથી 'વસન્તવિલાસ'ના જેવા ગૂજરાતી લઘુચિત્રોનો ઉદ્‌ગમ છે. કેમણાં કેમણાં જે 'બાલગોપાલસ્તુતિ' 'ભાગવત' અને 'ગીતગોવિંદ' જેવા વૈષ્ણવ, અને 'દેવીમાહાત્મ્ય' અને 'દુર્ગાપાઠ' જેવા શાકતગ્રંથોનાં આ જ શૈલીનાં લઘુચિત્રો મળી આવ્યાં છે તે ઉપરથી શ્રી. મહેતાના કથનને પુષ્ટિ મળે છે. ખરું જોતાં એ કાળની કળામાં જૈન અને બ્રાહ્મણ એવા ભેદો નહોતા; બંને પ્રકારનાં લઘુચિત્રોનાં વિશિષ્ટ લક્ષણો સરખાં છે; અને બંનેના આલેખકો પણ બહુધા સમાન હતા.

જૈન ચિત્રસાહિત્ય પુષ્કળ પ્રમાણમાં મળે છે એનું કારણ એ છે કે મધ્યયુગમાં કુમારપાલ, વસ્તુપાલ જેવા રાજ્યકર્તાઓએ અને સંગ્રામસોની જેવા ધનપતિઓએ અઢળક ધન ખર્ચીને જૈનગ્રંથોની નકલો કરાવી હતી અને જિનભદ્રસૂરિ જેવા ધર્મગુરુઓએ અથાગ પ્રયાસ કરી જ્ઞાનભંડારો સ્થાપ્યા હતા, જેની આજપર્યંત જૈનોએ ખૂબ સંભાળથી રક્ષા કરી છે. એથી ઊલટું વડનગર, પ્રભાસ, જૂનાગઢ વગેરે બ્રાહ્મણ જ્ઞાનપીઠોનો મુસ્લિમોએ વારંવાર વિનાશ કર્યો હતો. આથી બ્રાહ્મણ ગ્રંથો કરતાં જૈન સાહિત્ય વિપુલ પ્રમાણમાં મળે છે.

'ગૂજરાતી ચિત્રકલા' એ અભિધાન સ્વીકારતાં એક વાત ધ્યાનમાં રાખવાની છે. તે કાળે 'ગૂજરાત'માં રાજપૂતાનાના દક્ષિણ ભાગનો અને માળવાના કેટલાક પ્રદેશનો સમાવેશ થતો હતો. આ કારણથી કુમારસ્વામી કરે છે તેમ આ કલાને 'દક્ષિણ રાજસ્થાની' પણ કહી શકાય, અથવા પ્રો. બ્રાઉન અને શ્રી. રાવળની માફક 'પશ્ચિમ ભારતીય કલા' પણ કહી શકાય. પણ ગૂજરાતના ગ્રંથોમાંજ અત્યધિકાંશે આ કલાનાં નિદર્શનો મળે છે તેથી એને 'ગૂજરાતી કલા' કહેવી વધારે યોગ્ય છે.

ગૂજરાતની ચિત્રકલાની પરંપરા અતિ પ્રાચીન છે. મણિમેખલઇ, કથાસરિત્સાગર, તારાનાથ ઇ૦ ના ઉલ્લેખો ઉપરથી અજંતાઇલોરાના સમય પહેલાંથી ગૂજરાતમાં ચિત્રકલાનો વિકાસ થયેલો હોવાનું જણાય છે. એ આરંભયુગની કલાના નમૂના બચ્યા નથી. પછી અજંતા ઇલોરાનાં ભિત્તિચિત્રો આ કલાના વિકાસનું બીજું સોપાન દર્શાવે છે. ઇલોરાના કૈલાસનાથના મંદિરની છત ઉપર આલેખેલું લક્ષ્મીનું ભિત્તિચિત્ર ગૂજરાતી ચિત્રકલાનાં ઘણાં વિશિષ્ટ લક્ષણો પ્રગટ કરે છે.[૮] પછી ગૂજરાતની લઘુચિત્રોની પરંપરા શરુ થાય છે. અજંતાનાં ચિત્રોનું અપૂર્વ સંયોજન, રેખાંકનનું અનવદ્ય સૌન્દર્ય, આકૃતિ-

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૬ **The Story of Kalaka,** pp. 13–14.

૭ **Studies in Indian Painting,** pp 21-23.

૮ જુઓ A. K. Coomaraswamy, **History of Indian and Indonesian Art,** 1927, pl. Lvii, fig. 196.

એનું ભવ્ય આલેખન, સુશોભનની ભરચક સમૃદ્ધિ ગૂજરાતી ગ્રંથચિત્રોમાં (miniatures) નથી. અજંતાનાં ચિત્રો રાજ્યાશ્રયે તૈયાર થયેલાં, અને એમની રચના પાછળ ધર્મભાવનાની પ્રબળ, સાત્ત્વિક પ્રેરણા હતી, ત્યારે ગૂજરાતી ગ્રંથચિત્રોનો ઉદ્‌ગમ શ્રીમંતોને રિઝાવવાની વૃત્તિમાંથી છે. અજંતાનાં ચિત્રો 'કલાસિકલ' કલાનાં નિદર્શન છે; ગૂજરાતી ચિત્રોમાં સાંપ્રદાયિક કલા (hieratic art) અને લોકકલાનું સંમીશ્રણ છે. આથી અજંતાની કલા અને ગૂજરાતી કલાની સિદ્ધિ વચ્ચે ઘણું અંતર રહી જાય છે.

છતાં ગૂજરાતી ચિત્રકલાને એની આગવી વિશિષ્ટતાઓ અને સિદ્ધિઓ છે. એ પ્રધાનપણે રેખાંકનની (draughtsmanship) કલા છે. એનું રંગવિધાન ઊડીને આંખે વળગે એવું સચોટ છે, પણ એની ખૂબી તો રેખાગુંફનમાં જ છે. ઉતાવળે કાઢેલી રેખાકૃતિઓ તમામ પ્રસંગોનું નિરૂપણ કરે છે. એમાં સચોટ સાદૃશ્ય કે મનોહારી લાવણ્ય નથી, પણ પ્રસંગનિરૂપણમાં, વૃત્તાન્તકથનમાં આવશ્યક પ્રતીકો નિમેષમાત્રમાં ખડાં કરી દેવાનું સામર્થ્ય એમાં છે. આલેખ્ય પ્રસંગનું જાણે એ ચિત્રરૂપ ભાષ્ય બની રહે છે! એને ચિત્રલિપિ કહી શકાય, કારણ કે ચિત્રદ્વારા એ કથા કહી દે છે. આ ચિત્રોમાં એક પ્રકારની મુગ્ધતા (naivete) છે, ઉપરાંત આ લઘુચિત્રોદ્વારા સમકાલીન લોકજીવન–વસ્ત્રાભૂષણો, ગૃહોપસ્કર, લોકરિવાજ આદિ–સંબંધે પુષ્કળ માહિતી મળે છે.

આ ચિત્રોની રચનાકલા(technique)નાં કેટલાંક લક્ષણો ધ્યાન ખેંચે છે. એ પાર્શ્વાલેખન (profile) દર્શાવે છે, છતાં મુખની બીજી બાજુની આંખ અવકાશમાં ઉપસતી આલેખે છે. આંખો સવિશેષ લાંબી, અને નાક લાંબુ અને અણીદાર (pointed) આલેખે છે. આ ચિત્રો પૂર્ણસન્મુખદર્શન (full frontal view) ભાગ્યે જ બતાવે છે, અને જ્યાં સન્મુખદર્શન બતાવ્યું હોય છે ત્યાં એ 'પર્સ્પેક્ટિવ'ને અભાવે જરાયે આકર્ષક લાગતું નથી.

ચિત્રનાં પાત્રોનાં વસ્ત્રાભૂષણો સુંદર અને આકર્ષક હોય છે. પુરુષો ધોતીયું પહેરે છે, અને કટિ ઉપરનો ભાગ ખુલ્લો રાખે છે. તેઓ માથે મુકુટ અને હાથ ઉપર અને ગળામાં પુષ્કળ આભૂષણો પહેરે છે. એમની ટૂંકી દાઢી ધ્યાન ખેંચે છે. સ્ત્રીઓ ચોળી અને સાડી પહેરે છે, અને ઊંચા મોભાદાર કુટુંબની હોય તો માથે મુકુટ પહેરે છે. ચણિયો હજી વપરાશમાં આવ્યો નથી. સ્ત્રીઓ આજની માફક ઘરેણાંની ખૂબ શોખીન જણાય છે, પણ નાકની વાળી કે કટિમેખલા નજરે પડતી નથી. સ્ત્રીઓ વેણીને છૂટી રાખીને છેડે ફૂમતાં બાંધે છે.

ગૃહોપસ્કરમાં મોટા પલંગો, આસનો, ચંદરવા, ગાલીચા, હીંચકા ઇ૰ નજરે પડે છે.

પ્રકૃતિનું આલેખન સાંપ્રદાયિક ઢબનું (conventional) પણ આકર્ષક હોય છે. વૃક્ષો સુશોભન માટે તેમ ખાલી જગા પૂરવાને આલેખાયાં જણાય છે. વનસ્પતિ તેમજ પ્રાણીઓનું આલેખન સાંપ્રદાયિક પદ્ધતિનું હોય છે, પણ કઢંગું લાગતું નથી.

સોળમી સદી પછીથી ગૂજરાતી ચિત્રકલા રાજપૂત કલામાં વિલીન થઇ જાય છે, અને મુગલ ચિત્રકલાની અસર નીચે આવે છે. મુગલ ચિત્રકલાનું રંગવિધાન સૌમ્ય અને ગંભીર હોય છે અને માનવ મુખાકૃતિનિરૂપણ (portraiture) નિતાન્તસુંદર હોય છે.

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વૈષ્ણવ સંપ્રદાયની અસર રાજપૂત કાળની ચિત્રકલા ઉપર પુષ્કળ થઇ છે. એ અસર નીચે સંખ્યાબંધ 'ભાગવત' 'ગીતગોવિંદ' આદિ ગ્રંથોના સુશોભનાર્થે લઘુચિત્રો આલેખાયાં છે. 'ગીતગોવિંદ'માં પણ દશાવતારના પ્રસંગોનું સવિશેષ આલેખન થયું છે.

આવી એક દશાવતારપોથી મને પાટણમાંથી મળી આવી હતી. પોથીની સ્થિતિ ઉપરથી, ચિત્રોનાં પાત્રોની વેશરચના ઉપરથી, તેમ એમાં લખાયેલી મધ્યકાલીન ગૂજરાતી નોંધોના ભાષાસ્વરૂપ ઉપરથી એ ઇ. સ. ના સત્તરમા શતકની હોય એમ લાગે છે. એ એક સ્વતંત્ર ચિત્રપોથી (album) લાગે છે, કોઇ ગ્રંથનો ભાગ હોય તેમ જણાતું નથી. ચિત્રો સરાસરી ૮॥" × ૪॥" માપનાં છે. એમની સાચવણી બરાબર થઇ નથી, તો પણ એનું રંગવિધાન અદ્યાપિ હૃદયંગમ લાગે છે.

કાગળને બરાબર ઘૂંટાથી ઘૂંટીને, એના ઉપર પ્રથમ આકૃતિઓની રૂપરેખા આલેખીને, પછી લાલ કે અન્ય રંગની ભોંય (background) પૂરીને, પછી આકૃતિઓમાં ઉચિત રંગપૂરણી કરવામાં આવી છે.

આ ચિત્રપોથીની કલા પણ લોકકલાનું જ ઉદાહરણ છે. એની રેખાઓ સચોટ છે. અને એ વૃત્તાન્તની બધી વીગતો આપે છે. એમાં સાદાઇ છે તેમ આત્મશ્રધ્ધા પણ છે. પાત્રસંયોજનકલા આકર્ષક છે, અને રંગપૂરણી અત્યંત મનોરમ છે. ચાર ચિત્રોમાં ભોંય (backgrond) લાલ રંગની, અને બાકીનામાં આછા જાંબુડી, લીલા, કે ભૂરાશ પડતા લીલા રંગની છે. વિષ્ણુના અવતારો ભૂરા રંગમાં જ આલેખ્યા છે. પર્સ્પેક્ટિવ આમાં નજરે પડતું નથી. એક અપવાદ સિવાય સામાન્ય રીતે બધાં પાત્રોનું પાર્શ્વદર્શન જ (profile) કરાવ્યું છે. વીર અને અદ્‌ભુતના આલેખનમાં આ ચિત્રો ઘણાં સફળ છે.

આ ચિત્રોમાં વૃક્ષો અને પ્રાણીઓનું નિરૂપણ વાસ્તવિક પ્રકારનું અને મનોહર છે, કલ્કિ અવતારનો ઘોડો, કે આંબા, કેળ અને પીપળાનાં વૃક્ષો સપ્રમાણ અને સુંદર લાગે છે. વૃક્ષના આલેખનમાં મુગલ ચિત્રકળાની અસર સ્પષ્ટ છે. વૃક્ષો ચિત્રની બન્ને બાજુ આલેખાયાં હોય છે, અને તે ખાલી જગા પૂરી દઇને ચિત્રમાં સુશોભન આણે છે. સમુદ્રના તરંગો પણ ચિત્રકારે સરસ રીતે બતાવ્યા છે.

વસ્ત્રાભૂષણનું આલેખન આકર્ષક છે. પુરુષો–બ્રાહ્મણો અને દેવો પીતાંબર પહેરે છે અને ખભે ખેસ રાખે છે. કમર ઉપર કમરબંધ હોય છે. ક્ષત્રિયો અને અનુચરો અંગરખા અને પાયજામા પહેરે છે અને ખેસ જેવા વસ્ત્રથી કમરબંધ બાંધે છે. રાજાઓ અને દેવો માથે મુકુટ પહેરે છે. બ્રાહ્મણો માથું ખુલ્લું રાખે છે, લાંબા વાળ રાખીને અંબોડો બાંધે છે અને એમાં ફૂલ ભરાવે છે. અનુચરો માથે રાજસ્થાની પાઘડી પહેરે છે. કેટલીક પુરૂષાકૃતિઓએ પગે જોડા પહેર્યા છે. પુરુષોમાંથી કેટલાકને દાઢી છે.

સ્ત્રીઓ આજના જેવોજ પોશાક પહેરે છે–ચોળી, ચણિયા, અને સાડી. પીળાં કે લાલ વસ્ત્રો તેઓ વધારે પસંદ કરે છે. સ્ત્રીઓએ જોડા પહેર્યા નથી.

પુરૂષો અને સ્ત્રીઓ બંને ઘરેણાંનાં ખૂબ શોખીન જણાય છે. સ્ત્રીઓ ચૂડી, કંકણ, બાજુબંધ, હાર, હાંસડી, દામણી, કુંડલ, ઝાંઝરી, વગેરે આભૂષણો ધારણ કરે છે, અને વેણી

વરાહ અવતાર

દેવપ્રસાદ મુખોપાધ્યાય

છૂટી રાખી એને છેડે ફૂમતું બાંધે છે. પુરૂષો હાર, કડાં, કુંડલ અને સોનાનો કંદોરો કે કમરબંધ પહેરે છે. પુરૂષો અને સ્ત્રીઓ બંનેના કપાળ ઉપર તિલક હોય છે.

બે ચિત્રોમાં નિવાસસ્થાનનો બેઠકનો ખંડ બતાવ્યો છે. એના કમાનવાળા નાજુક થાંભલા, છત, કાંગરા, ઝરૂખા ઇ૦ આકર્ષક લાગે છે. ઘરમાં પલંગ, પાટ, તકીયા સિંહાસન ઇ૦ બતાવ્યા છે.

આ રીતે આ ચિત્રો એ કાળના જીવનની ઝીણવટભરી માહિતી પૂરી પાડે છે.

આ દશાવતારનાં ચિત્રો ગૂજરાતી ચિત્રકલાનું અંતિમ સ્વરૂપ દર્શાવે છે. એમાં રાજસ્થાની કલાના ઘણા અંશો પ્રવેશ્યા છે, અને મુગલ ચિત્રકલાની પણ થોડી અસર થઇ છે. તેથીજ પ્રાણીઓ અને વૃક્ષોનું આલેખન વાસ્તવિક અને સુંદર બન્યું છે. રાજસ્થાની કલાના અંશો ભળ્યા છતાં આ ચિત્રકલાના ગૂજરાતીપણા વિષે શંકા નથી. ચિત્રોનું પાત્રસંયોજન અને રંગપૂરણી મનોહારી છે. આ કાળનાં ગૂજરાતી ચિત્રો બહુ વિરલ છે; એમાં આ ચિત્રોનું સ્થાન ઘણું મહત્વનું છે.

ચિત્રનોંધ

પ્રથમ ચિત્ર વરાહાવતારનું છે. વચ્ચેની આકૃતિ વરાહ ભગવાનની છે. એમનું શરીર મનુષ્યનું છે અને મુખ વરાહનું છે. વરાહ ભગવાને પીતાંબર અને બેસ પહેર્યાં છે. એમને માથે સોનાનો મુકુટ છે, ગળામાં મોતીની માળા છે, હાથમાં કડાં અને પગમાં તોડા છે. એમના ચાર હાથમાં વિષ્ણુનાં આયુધો–ગદા, શંખ, પદ્મ અને ચક્ર છે. એમના દાંત ઉપર એક ગોળ પાત્ર છે, અને એમાં એક નાની સ્ત્રી આકૃતિ બેઠેલી છે. એ પૃથ્વી છે, જેને વરાહ ભગવાને હિરણ્યાક્ષ દાનવના અત્યાચારમાં મુકત કરી છે. વરાહ ભગવાનનો અંગવિન્યાસ (pose) મનોહર છે.

દાનવ હિરણ્યાક્ષ અગ્રભૂમિમાં (foreground) જરા ડાબી બાજુએ છે. એનું મોં પશુનું છે, અને એને પૂંછડી છે, પણ એનો બાકીનો દેહ માનવનો બતાવ્યો છે. એણે માનવ પોશાક પહેર્યો છે. એનો વધ કરીને વરાહ ભગવાને એને કચરી નાખ્યો છે.

બે ચામરધારીઓ વરાહ ભગવાનને ચામર ઢોળે છે. એમણે અંગરખા અને પાયજામા પહેર્યાં છે, અને એમને માથે રાજસ્થાની પાઘડી છે.

જમણી બાજુ અગ્રભૂમિમાં નદીનો ભાગ બતાવ્યો છે. એમાંથી કમળો ઉપર આવ્યાં છે. એની જરા ઊંચે એક સુંદર આમ્રવૃક્ષ છે. ડાબી બાજુએ કેળની અર્ધાકૃતિ (half-view) આલેખી છે. ચિત્રને મથાળે આકાશની નાની પટ્ટી જણાય છે.

ચિત્રનું રેખાંકન સુકુમાર અને સ્પષ્ટ છે, અને વરાહ ભગવાનના આલેખનમાં, એમના અંગવિન્યાસમાં પ્રતાપ અને ગૌરવ સાથે માર્દવ છે. ચિત્રમાં ભાવના અને વાસ્તવનું સુભગ મિશ્રણ છે.

બીજું ચિત્ર વામન અવતારનું છે. એમાં રાજગૃહના આંગણામાં બલિરાજા, એમનાં રાણી, વામન ભગવાન, અને શુક્રાચાર્યની આકૃતિઓ આલેખી છે.

બલિરાજા પોતાના હાથમાંની ઝારીમાંથી વામનના જમણા હાથમાં દાનના સંકલ્પનું જલ રેડે છે. બ્રાહ્મણની માફક બલિએ પીતાંબર અને ઉપવસ્ત્ર પહેર્યાં છે, કારણ કે એ યજ્ઞના ધર્મકાર્યમાં રોકાયેલા છે. એમના ગળામાં હાર છે, ખભે યજ્ઞોપવીત છે અને હાથમાં વલય છે. એ વામનની સામે એકધ્યાનથી જોઇ રહ્યા છે, કેમ જાણે શુક્રાચાર્યની વામનને દાન ન આપવાની સલાહ વિષે વિચારતા ન હોય!

વામન બલિની જમણી બાજુ ઊભા છે. એમની અતિ નાની આકૃતિ બધાં પાત્રોમાં તરી આવે છે. એમની ઋષિ જેવી દાઢી, અને કાઠિયાવાડી ઢબની સફેદ પાઘડી, તથા નાની નાજુક છત્રી ખાસ ધ્યાન ખેંચે છે. એમણે ધોળું ધોતીયું અને રંગીન ઉપવસ્ત્ર પહેર્યાં છે. એમના ડાબા હાથમાં કમંડલુ છે. એમણે પોતાનો જમણો હાથ બલિ તરફ સંકલ્પજલ સ્વીકારવાને ધર્યો છે. એ બલિ સામે અનિમેષ જોઇ રહ્યા છે; જાણે એના મનના વિચારો એ તપાસી રહ્યા છે. એમની જનોઇ અવળી બાજુ બતાવી છે; કાંતો એ ચિત્રકારની ભૂલ છે; અથવા તો જનોઇ બરાબર દેખાઇ આવે એટલા માટે જાણી જોઇને એણે એમ અવળી બાજુ બતાવી છે.

વામનની પાછળ જમણી તરફ શુક્રાચાર્ય ઊભા છે. એમણે લાલ પીતાંબર અને સફેદ ઉપવસ્ત્ર પહેર્યાં છે. એમણે પણ બલિની માફક હાર, કડાં, કુંડલ ઇ૦ ધારણ કર્યાં છે. જમણો હાથ ઊંચો કરીને એ બલિને આ કાર્યમાંથી વિરમવાની આજ્ઞા કરે છે, અને ડાબો હાથ વામન તરફ બતાવી વામનનું વાસ્તવિક રૂપ બલિને જણાવતા લાગે છે.

બલિની પાછળ એની રાણી ઊભી છે. એ સહેજ આગળ ઝૂકી છે. એ ચક્રવર્તીની રાણી હોવાથી સુંદર વસ્ત્રાભૂષણોમાં સજ્જ છે. એણે ચોળી, ચણિયો, ને ઝીણી સાડી પહેરી છે, અને ચૂડીઓ, બાજુબંધ, દામણી, બોર, હાંસડી, હાર, નૂપુર વગેરે આભૂષણો ધારણ કર્યાં છે. એના મુખ પર પ્રસન્નતાનો ભાવ છે.

આકૃતિઓમાંથી કોઇએ જોડા પહેર્યા નથી, કારણ કે સહુ યજ્ઞકાર્યમાં વ્યાપૃત છે.

જમણી બાજુ એક વૃક્ષની અર્ધાકૃતિ આલેખી છે. એ વૃક્ષ ઓળખી શકાતું નથી. ડાબી બાજુ બલિના મહેલનો બેઠકનો ભાગ બતાવ્યો છે. એના કમાનવાળા સ્થંભ, છત, કાંગરા ઇ૦ સ્પષ્ટ રીતે આલેખાયાં છે. અંદરની દિવાલમાં ગોખલો બતાવ્યો છે. બેઠકમાં પલંગ છે, અને એના ઉપર ગોળ તકીયો અને ઓરીસો છે. પલંગ પર્યંકટિવ વિના બતાવ્યો છે. એની નીચે નાનો બાજઠ છે. છત ઉપરથી એક ચંદરવો લટકે છે.

દશાવતારનાં બધાં ચિત્રોમાં વામનાવતારનું ચિત્ર સર્વોત્તમ છે. એનું પાત્રસંયોજન કુશળતાયુક્ત છે, અને રેખાંકન ખૂબ નાજુક છે. એની રંગપૂરણી પણ ચારુતાભરી છે. પાત્રોના મુખ ઉપરના ભાવો પણ આ સાંપ્રદાયિક કલાની મર્યાદાઓ છતાં સારા આલેખાયા છે: બલિના મુખ ઉપરનું વિચારમંથન, રાણીના મ્હોં ઉપર સંતોષની છાયા, વામનના મુખ ઉપર કુતૂહલનો ભાવ, અને શુક્રના મુખ ઉપરનો ઉત્કટ ક્રોધ સ્પષ્ટ રીતે વરતાઇ આવે છે. સમગ્ર સંગ્રહનું આ લાક્ષણિક અને સર્વોત્તમ ચિત્ર છે.

REVIEWS

THE MURIA AND THEIR GHOTUL. DR. VERRIER ELWIN. OXFORD UNIVERSITY PRESS. INDIAN BRANCH. PP. 730 + XXIX. WITH PHOTOGRAPHS, FIGURES AND COLOURED PLATES. PRICE RS. 25.

The author is well-known throughout the world not only as a friendly social worker among the tribal population of India and a social anthropologist but also as a literary artist of great merit. The Oxford University has already awarded him several scholarships, prizes, medals and crowned him with the D.Sc. degree on the strength of his books. He is at present the Deputy Director of the Anthropological Survey of India.

In this new book, Elwin surpasses himself. In the grandeur and symmetry of design as well as in its literary and artistic execution, there are few books that can excell this one. The publication in India of a book of this size and merit is an unusual event. It gives a high place to Indian anthropology in the world's literature on the subject. A volume of 760 closed printed pages with 150 excellent photographs, three coloured plates, 140 figure and line drawings and ten maps must have involved heavy labour and financial outlay for the author, who spends such a lot of his time among wild aboriginal tribes.

The Muria tribe has already been described by Mr. Grigson but Grigson pales into insignificance before the thoroughness and encyclopaedic character of Elwin's new book, even though the latter mainly centres round the Ghotul. What then is the Ghotul? It is village dormitory which traces its origin to the Lingo pen, the cult-hero of the Gonds, and of which all unmarried boys and girls must be members. The membership is carefully organised and the initiation takes place after a period of testing. The boy members are known as cheliks and girl members as motiaris, the boys' leader is known as the Sirdar and girls' leader the Belosa. They have important duties to perform on all social occasions. The boys act as companions to bride-grooms and the girls as bridesmaids at weddings. Both dance before the clan-god and at the great fairs. They form a choir at the funerals of important people. Their games and dances enliven village life and redeem it from the crushing monotony that is its normal characteristic in other parts of India. The Muria Ghotul is an unique institution, being related functionally to every aspect of the tribe's life and the importance of its study for the purpose of understanding of the Muria Culture as a whole cannot be exaggerated. Even though Dr. Elwin is apologetic for his minute and rather too full description of the simple, sensuous and passionate sex-life in the Ghotul, he asserts that the suspicions of the Ghotul as a place of sexual licence are unfounded. He considers the Muria Ghotul of Bastar State, the centre of social and religious life. According to him Muria life may be described as having in its pre-nuptial period many of the features of Huxley's *Brave New World* but in its post-nuptial period the atmosphere of the poems of Tennyson.

Elwin is aware of the opinions of several authors like S. C. Roy, that dormitories are an abomination and the opinion of some committees that such dormitories should be discouraged if they lead to premarital promiscuity. He thinks that Ghotul institution has many useful functions in Muria society and is a symptom of a certain stage of cultural development with which he would not interfere. The message of the Ghotul—that youth must be served, that freedom and happiness are more to be treasured than any material gain, that friendliness and sympathy, hospitality and unity are of the first importance, and above all that human love and its physical expression is beautiful clean and precious. It is the opinion of the author that if the Murias are today happy, free, and innocent, it is due to their freedom of their Ghotul life which he would not like to disturb. It is, however, doubtful if with modernisation that is permeating village life, even the Murias of Bastar State can live long in this isolation. The book will, therefore, remain a classical description of a fast dying institution.

Apart from the sexual life of the Murias, in the Ghotuls which has been described by the author with brutal frankness which may shock many puritanistic readers, the book provides excellent reading from the beginning to the end. Each of the chapters on the organisation of the tribe, the course of Muria life, the Muria religion, dreams, the dance, songs, games and recreations is interesting. The keen scientific sense of this Oxford anthropologist has inspired him to collect and tabulate unusual statistical data. The appendices and index are in themselves valuable for a scientific study of the subject. It is a matter of great good fortune for this country that a scholar and humanist of this type has decided to marry a Gond wife and to rear a family and to domicile in India. The concluding words of the author express his great love for this much neglected and least vocal of minorities in India. "India still tends to regard her primitive population as something to be regretted. This book may perhaps help to show that the hills and forests hold a rich human treasure, natural to her soil, part of her great culture, which she should not despise."

P.G.S.

લૂઇ પાશ્ચર. લેખક પ્રાધ્યાપક ડૉકટર નરસિંહ મૂળજીભાઇ શાહ એમ. એસ. સી. પી. એચ. ડી. પ્રકાશક ગુર્જર ગ્રંથરત્ન કાર્યાલય. અમદાવાદ. પૃ. ૧૫૬, કિંમત બે રૂપીઆ. ૧૯૪૮.

પ્રાધ્યાપક ડૉકટર નરસિંહ શાહ ગુજરાતી ભાષામાં વૈજ્ઞાનિક સાહિત્યના થોડાએક સર્જકોમાં અગ્રસ્થાન ભોગવે છે. ઉર્મિ માસિકના લેખકોમાં વૈજ્ઞાનિક સાહિત્યને આગળ પાડનાર અને સમાજને ગુજરાતી ભાષામાં વૈજ્ઞાનિક સાહિત્યનો દર માસે પ્રચાર કરનાર ત્રિપુટીમાં પણ એમનું નામ છે. માદામ કયુરી વિષે એક સુંદર પુસ્તક એમણે ગયા વર્ષે લખ્યું હતું અને આ વર્ષે પાશ્ચરનું જીવનચિત્ર પ્રસિદ્ધ કરીને પોતાની કીર્તિમાં વધારો કર્યો છે.

લૂઇ પાશ્ચર (૧૮૨૨–૧૮૯૫) એ મહાન્ ફ્રેન્ચ વિજ્ઞાનશાસ્ત્રીનું જીવન એટલે યૂરોપનો આગણીસમા શતકની વૈજ્ઞાનિક પ્રગતિનો ઇતિહાસ. જોકે પાશ્ચરે તો એક સાધારણ રસાયનશાસ્ત્રી

અને શાળાના ઉપશિક્ષક તરીકે પોતાનું જીવન શરૂ કર્યું હતું; પરંતુ તેની વિચક્ષણ સંશોધક શક્તિને લીધે તેણે અનેક દિશામાં સંશોધન કર્યું હતું અને તેથી તેની કીર્તિ કેવળ એક વિજ્ઞાનની શાખાની ખીલવણી ઉપર રહી નથી પરંતુ અનેકદેશીય છે. તે ઉપરાંત તેની અપ્રતિમ વૈજ્ઞાનિક વૃત્તિ, નમ્રતા, ખંત, ધૈર્ય, અને વિજ્ઞાનવીરને છાજતા સઘળા ગુણોથી વિજ્ઞાનના અભ્યાસી અને સેવકોને તેનું જીવનચરિત્ર અત્યંત રસમય અને ઉપયોગી લાગ્યા વિના રહેતું નથી. આવા ઉત્તમ કોટિના વૈજ્ઞાનિકનું જીવનચરિત્ર સરળ અને સાદી ભાષામાં, નાના મોટા બધાને રસમય લાગે તેવી શૈલીમાં, તૈયાર કરીને પ્રાધ્યાપક નરસિંહ શાહે એક ઉત્તમ કાર્ય કર્યું છે, તેને માટે ધન્યવાદ ઘટે છે.

પાશ્ચરના સમકાલીન થોમસ હકસ્લી અને ચાર્લ્સ ડારવીનના જીવનચરિત્રો વિજ્ઞાનના ઇતિહાસમાં ઘણાં રસપ્રદ અને બોધપ્રદ છે. આવા પુસ્તકો આપણી ભાષામાં વધતી જતી સંખ્યામાં તૈયાર થાય નહીં ત્યાંસુધી આપણને વિજ્ઞાનનું રહસ્ય, વૈજ્ઞાનિક વૃત્તિ અને વૈજ્ઞાનિક સંશોધનના પાયા નાખવાની પણ આપણી તૈયારી થઇ છે એમ ગણાય નહી.

મહાન વૈજ્ઞાનિકો: ખંડ ૧. પ્ર. ૯૬. ખંડ ૨. પૃ. ૮૦, લેખકો ડૉ૦ સુરેશ મ. શેઠના અને ડૉ૦ નરસિંહ મૂ. શાહ. પ્રકાશક ભારતી સાહિત્ય સંઘ, મુંબઇ અને અમદાવાદ. કિંમત દરેક ખંડનો એક રૂપિયો.

આ બે ઉત્સાહી અધ્યાપકોએ પોતાની પુરસદનો ઉપયોગ આ પુસ્તકોની તૈયારી કરવામાં વાપરીને સમાજ ઉપર ઉપકાર કર્યો છે એટલું જ નહીં પણ પોતાની કીર્તિમાં પણ વધારો કર્યો છે. પંદરમાંથી ઓગણીસમાં સૈકા સુધીમાંના યુરોપના પ્રસિધ્ધ વૈજ્ઞાનિકોમાંથી ચૌદ વિભૂતિઓનાં ટુંક જીવનચિત્રોનો રસિક અને બાલોપયોગી ભાષામાં આ પુસ્તકોમાં સમાવેશ કરવામાં આવ્યો છે. વિજ્ઞાનમય યુગમાં આપણા કિશોરોને આવા રસપ્રદ જીવનચિત્રો વાંચવાના મળે અને તેમની વિજ્ઞાનવૃત્તિ પોષવાના પ્રસંગો મળે એ સદ્‌ભાગ્યની વાત છે. આ ઉત્સાહી લેખકો આ દિશામાં તેમના પ્રયાસો ચાલુ રાખશે અને વાયુપ્રવચન ખાતાની મદદ મળે કે ન મળે તો પણ બીજા વૈજ્ઞાનિકોના જીવનચિત્રો તૈયાર કરશે એવી આશા રાખીશું. કોપરનિકસ, ગેલીલીઓ, કેપ્લર, ટાઇકો બ્રાહે, વીલીઅમ હાર્વે, હાઇગેન્સ, સર આઇઝેક ન્યુટન, બોઇલ, લીનીઅસ, કેવેન્ડીશ, લાવોઝીએર, જેનર, ડેવી, વૉલ્ટા એ પ્રબળ વિજ્ઞાનવીરોની સાથે હિંદના વૈજ્ઞાનિકો વિષે માહિતી ભેગી કરીને પ્રસિધ્ધ કરવામાં આવે એ ઇષ્ટ છે. આર્યભટ્ટ, વરાહમિહિર, ભાસ્કરાચાર્ય, ચરક, સુશ્રુત, નાગાર્જુન વગેરે પ્રાચીન વિભૂતિઓ, અને ગજ્જર, બોસ, રામાનુજમ, રમણ, મેઘનાદ સાહા, ભટનાગર, ભાભા વગેરે અર્વાચીન વિભૂતિઓનાં જીવનમાં નવા યુગના કિશોરોને જરૂર વધારે રસ અને ઉત્તેજન પ્રાપ્ત થશે.

ACKNOWLEDGMENTS

Indian Journal of Social Work, Vol. VIII, No. 3, 1947.

Science & Culture, Vol. XIII, Nos. 9, 10, 11.

Journal of the Ganganath Jha Research Institute, Vol. IV, Parts 3-4, 1947.

Journal of the Indian Merchants Chamber, Vol. XLI, Nos. 3, 4, 5.

Journal of Scientific & Industrial Research, Vol. VII, Nos. 4, 5.

Annals of the Bhandarkar Oriental Research Institute, Vol. XXVIII, Parts I-II, 1947.

Journal of the Bombay Natural History Society, Vol. 47, No. 2, December, 1947.

Bulletin of the Deccan College Research Institute, (K. N. Dikshit Memorial) Vol. VIII, Nos. 1-2, August, 1947.

Journal of the Bombay Branch of the Royal Asiatic Society, Vol. 22, 1946.

ગુજરાત સાહિત્ય સભા, અમદાવાદ, કાર્યવહી–સને ૧૯૪૫-૪૬, ગુજરાત સાહિત્ય સભા, અમદાવાદ. નૂતન શિક્ષણ, માર્ચ, એપ્રિલ–મે, ૧૯૪૮. બુદ્ધિ પ્રકાશ, જાન્યુઆરી–માર્ચ ૧૯૪૮. પૂર્ણા, પુસ્તક ૨, અંક ૮. ૯, ૧૦. પુસ્તકાલય, પુસ્તક ૨૬, અંક ૮, ૯, ૧૦. કુમાર, વર્ષ–૨૫, અંક–૩, ૪, ૫. સંસ્કાર, વર્ષ–૨, અંક–૩, માનસી, વર્ષ–૧૧, અંક, ૩-૪.

ફાર્બસ ગુજરાતી સભાનું ત્રૈમાસિક, પુસ્તક ૧૨, એપ્રિલ–સપ્ટેમ્બર ૧૯૪૭. પ્રકૃતિ, પુસ્તક ૭, અંક ૧. જય ગુજરાત; પ્રજાબંધુ; ભારતી–નિયમિત.

The Gujarat Research Society invites applications from trained graduates possessing the B.T. degree for conducting a research on the comparative value of the training given in ordinary and Montessori schools in the province. The person selected will have to test about 500 children individually which may take about 10 months' time. A grant will be made to cover the expenses of the research. Expert guidance will be arranged for and the teacher will be allowed to register his name for the degree of M.Ed. by thesis. Applications should reach the Secretary, Gujarat Research Society, 46-48, Esplanade Mansion, Mahatma Gandhi Road, Bombay 1.

REPORT OF THE GUJARAT RESEARCH SOCIETY FOR THE YEAR 1947

During the year 1947, the Society had a total of 201 members, consisting of 1 Patron, 1 Honorary Member, 13 Donors, 76 Life-Members, 106 Ordinary Members and 4 Associate Members. In the previous year the total number of members was 198.

Research Activities:

The research activities of the Society continued during the year at an accelerated pace. The chief of these are mentioned below:

(*i*) The Anthropological, Serological and Health Survey of Gujarat, Kathiawar and Cutch carried out by Dr. D. N. Majumdar of Lucknow University was completed. A preliminary report of this work has already been published in October 1946—January 1947 issue of the Journal. The first part of the report on survey of serological or blood grouping has been submitted by Dr. Majumdar and will be published soon; the second part on anthropometric measurements will follow.

(*ii*) *Health Centres:* The Society's Health Centre, which was opened in November 1946 at Parekh Building, near Opera House, was continued till April 1947 when it had to be closed down. During this term about 175 males, 134 females and 78 children were health surveyed. In addition to the ordinary clinical examination, exact scientific data regarding sugar, albumin in urine and of hæmoglobin and white and red blood corpuscles were collected.

In the meantime, another Health Centre was opened at Khar in March 1947 for the benefit of the people of the Suburbs and secure data for homogeneous families. Dr. S. T. Kantwala and Dr. S. C. Sheth are in charge of this Centre. We are thankful to them as well as to Dr. B. B. Yodh, Dr. Chamanlal Mehta, Dr. Jagmohandas Parekh for their guidance and suggestions from time to time in making the Centre a success. The Hon'ble Dr. M. D. D. Gilder, Minister for Public Health, visited the Health Centre on 10th December 1947. He expressed satisfaction at the work and made valuable suggestions for its continuance. The total number of persons whose health had been thoroughly surveyed is about 600 and the detailed report when ready will be of great scientific value.

(*iii*) *Anæmia Research:* The research on the Incidence of Anæmia among Gujarati Women in the City of Bombay which was started on 1st June 1946 has recently been completed. The aim of this research is to study and find out the nature and types of anæmia and probable factors responsible for causing anæmic condition in Gujaratis. This work was carried out by Dr. K. U. Jhatakia at Sir Hurkisondas Hospital under the guidance and supervision of Dr. B. B. Yodh. The results of this inquiry are being tabulated and it is hoped to publish the results soon.

(*iv*) The report of the Ornithological Survey of the Birds of Gujarat, Cutch and Kathiawar entrusted to Mr. Salim Ali has been received and will be published in the Journal.

(*v*) Further progress has been made in the Linguistic Survey of the Borderlands of Gujarat carried out by Dr. T. N. Dave. Dr. Dave last year toured northern boundaries of Radhanpur, Palanpur and Rajpipla. During the year under review, he visited Dharampore and Bansda territories for this research work. We are grateful

to His Highness the Maharaja Saheb of Dharampore and His Highness the Maharaja Saheb of Bansda for the kind help given to this Society in this work.

(*vi*) The Scheme of Intelligence Test of Gujarati Children entrusted to Messrs. J. H. Trivedi, and M. P. Vaidya has been completed and we await their report.

(*vii*) During the year under review, the Society selected Mr. A. V. Pandya to make a preliminary survey for exploration of archæological remains in the deltaic portion of the lower Narbada Valley and the neighbouring coast of Kathiawar.

Publications :

The Society continued to publish its Journal in English and Gujarati in which research articles on various important topics relating to Maha Gujarat by distinguished scholars as well as results of its own research were published. This year we have been able to publish a special Medical Science Number in April 1947, consisting of valuable articles from Dr. Jivraj Mehta, Dr. B. B. Yodh and Dr. K. S. Mhaskar. Mr. P. G. Shah's article on " A National Biometric Plan " to assess whether efficiency of the nation is going up or down has attracted considerable attention. We were also able to publish a Statistical Abstract of Maha Gujarat containing all available statistics for Maha Gujarat. This is the first of the Monographs of Maha Gujarat which have been planned by this Society.

The Society also publishes from time to time the results of its own research in separate brochures in Gujarati. We had till the end of 1946 published 4 pamphlets ; No. 4 is running into 2nd edition. A new pamphlet No. 5 on " Care of Mother and Children " has been added to this series this year.

Miscellaneous :

During the year a lecture by Prof. V. B. Athavale, Professor of Geography H. P. T. College, Nasik, was arranged. He spoke on " Authenticity of Shri Krishna's Movements in Gujarat." The speech has been printed in October 1947 issue of the Journal. Besides this lecture, several meetings were arranged, one of them being to meet Prof. C. N. Vakil on his return from U. S. A.

Donations :

In addition to the usual grant from Sir Purshotamdas Thakurdas, Seth Tulsidas Gopalji Charitable and Dhakleshwar Temple Trust, Shree Mahalaxmi Temple Charities, Seth Harjivandas Purshottamdas Trust, Ahmedabad, and the Government of Bombay, special donations were also received from His Highness the Maharana Saheb of Porbandar, Seth Ramdeo Podar, Seth M. C. Parikh, and Raj Ratna Hansraj Kamani. To all of them our thanks are due.

Funds :

The accounts of the year 1947, which are circulated herewith, show a deficit of Rs. 1,850-9-9. This has been due to the increasing research activities of the Society. If the Society is to continue its useful work, more funds would be essential. It is, therefore, hoped that members and sympathisers will contribute liberally to the Society's funds.

D. T. LAKDAWALA,
Hon. General Secretary.

13th March, 1948.

THE GUJARAT RESEARCH SOCIETY, BOMBAY

Balance Sheet as at 31st December, 1947.

FUNDS & LIABILITIES	Rs. a. p.	Rs. a. p.	PROPERTY & ASSETS	Rs. a. p.	Rs. a. p.
FUNDS:			FURNITURE: (At Cost):		
PERMANENT FUND:			Balance as per last Balance Sheet ..	415 0 0	
Balance as per last Balance Sheet ..	27,301 0 0		Additions during the year	100 0 0	
Add: Subscriptions from Life Member received during the year	250 0 0			515 0 0	
		27,551 0 0	*Less:* Depreciation written off to date..	132 8 0	
					382 8 0
RESEARCH & EXPLORATION FUND:			INVESTMENTS: (At Cost) *Face Value*		
Balance as per last Balance Sheet ..	2,280 0 0		3% Conversion Loan 1946 .. 37,700		
Add: Interest received during the year	70 0 0		3% Conversion Loan 1986 .. 3,000		
		2,350 0 0	3% 1951-54 Govt. Loan .. 300		
			3% 1st Development Loan 1970-75 2,000	41,782 8 2	
HISTORY OF GUJARAT SCHEME ACCOUNT:			HISTORY OF GUJARAT SCHEME INVESTMENTS: (At Cost):		
Balance as per last Balance Sheet ..	1,899 0 0		3% 1st Development Loan 1970-75 of the face value of Rs. 1,000	948 12 8	
Add: Interest received during the year	35 0 0		RESEARCH AND EXPLORATION FUND INVESTMENTS: (at Face Value):		
	1,934 0 0		3% 1st Development Loan 1970-75 of the face value of Rs. 2,000	2,000 0 0	
Less: Expenses incurred during the year	387 0 0				44,731 4 10
		1,547 0 0	(The Market Value of the above Securities as on 31st December 1947 was Rs. 46,649-0-0).		
GENERAL FUND:					
Balance as per last Balance Sheet ..	15,006 14 3		OUTSTANDING FOR SUBSCRIPTIONS & JOURNAL ADVERTISEMENTS ..		562 0 0
Less: Excess of Expenditure over Income for the year	1,850 9 9		CASH & OTHER BALANCES:		
		13,156 4 6	In Current Account with the Imperial Bank of India	411 8 8	
LIABILITY FOR EXPENSES		2,046 6 6	Cash on hand	563 5 6	
					974 14 2
Total Rs. ..		46 650 11 0	Total Rs. ..		46,650 11 0

We have examined the Balance Sheet of the Gujarat Research Society, Bombay, as at 31st December 1947, above set forth, with the Books and Vouchers of the Society and find the same to be correct.

DALAL & SHAH,
Incorporated Accountants,
Registered Accountants,
Hon. Auditors

Bombay, 8th March 1948.

A. S. KALAPESI,
Hon. Treasurer

D. T. LAKDAWALA,
Hon. General Secretary

THE GUJARAT RESEARCH SOCIETY, BOMBAY

Income & Expenditure Account for the year ended 31st December, 1947.

EXPENDITURE	Rs.	a.	p.	Rs.	a.	p.	INCOME	Rs.	a.	p.	Rs.	a.	p.
To Printing Expenses of the Journal ..	2,404	4	0				By SUBSCRIPTIONS :						
Anthropological Research Expenses ..	700	0	0				From Ordinary Members	1,275	8	0			
Linguistic Research Expenses	170	10	0				From Associate Members	3	0	0			
Gujarati Pamphlet Series Expenses ..	1,011	3	0								1,278	8	0
Anæmia Research Survey Expenses ..	2,850	0	0				Subscriptions, Advertisement Charges and Sale of Journal				612	8	0
Health Centre Scheme Expenses ..	5,455	3	0										
Health of Gujarati Child Birth Research Expenses	100	0	0				Interest on Securities				1,437	12	9
Narbada Valley Research Expenses ..	136	12	0										
Social Meeting Expenses	194	0	0				DONATIONS :						
Scholarships	80	0	0				From :						
Salaries	2,092	8	0				H.H. The Maharaja of Porbunder	2,500	0	0			
Rent	300	0	0				Seth Ramdeo A. Podar	1,500	0	0			
Printing and Stationery	71	12	0				Sir Purshottamdas Thakurdas ..	1,500	0	0			
Postage	205	8	0				Messrs. Mangaldas Mehta & Sons	1,000	0	0			
Conveyance & Miscellaneous Expenses	70	10	6				Raj Ratna Hansraj Kamani ..	1,001	0	0			
				15,842	6	6	Seth H. P. Trust, Ahmedabad ..	600	0	0			
Depreciation on Furniture				24	0	0	Seth Tulsidas Gopalji Charitable and Dhakleshwar Temple Trust	1,200	0	0			
							Shree Mahalaxmi Temple Charities	600	0	0			
							Sundry Donations	286	0	0			
											10,187	0	0
							Government Grant				500	0	0
							BALANCE, being Excess of Expenditure over Income during the year ..				1,850	9	9
Total Rs. ..				15,866	6	6	Total Rs. ..				15,866	6	6

Examined and found correct
(Sd.) DALAL & SHAH
Incorporated Accountants,
Registered Accountants,
Hon. Auditors

A. S. KALAPESI
Hon. Treasurer

D. T. LAKDAWALA
Hon. General Secretary

Bombay, 8th March 1948.

JOURNAL
OF THE
Gujarat Research Society

Vol. X JULY 1948 No. 3

EDITORIAL NOTE

We have been able to present to the readers of the Gujarat Research Society Journal a whole number devoted to medical and health subjects. Ever since the inception of the Society, amongst its many sided activities, education in health matters and research in certain aspects of medicine have been attempted by the Medical sub-committee. The first study undertaken was on the nutritional status in correlation with the economic condition of middle class Gujarati families. The results were published and widely distributed. The success achieved in this study was largely due to the active guidance of Dr. Jivraj Mehta, the first Chairman of the Medical sub-committee and a Vice-President of the Society, to the hard work of the two research workers Dr. V. V. Shah and Dr. M. H. Patel, to the munificence of Sir Purshottamdas Thakurdas and to the kind co-operation of the authorities of the Sir Harkisondas Hospital. The next activity undertaken was on the infant mortality which was possible by the able guidance of Dr. Chamanlal Mehta and the co-operation of various maternity hospitals. A series of radio talks given by members of the Medical sub-committee were published by the Society for distribution to the public.

In this issue we publish another study, this time on anæmias, one of the most pressing problems amongst city dwellers, and more so amongst middle and poor class Gujaratis. Dr. Jhatakia and his collaborators who have conducted the studies under the guidance of the Honorary Physicians of the Sir Harkisondas Hospital and with the close co-operation of the authorities and medical and pathological departments of the Hospital, has produced a comprehensive and instructive report. The studies reveal, in no uncertain terms, the grossly inadequate nutritional status of these patients and this forms the main cause of anæmia. It also reveals that, besides the financial poverty of these people, which is to a certain extent responsible for inadequate diets, ignorance and the resulting imbalance in the quality and quantity of the foods consumed is largely responsible for the anæmia. It is also shown that it is largely preventable. We are glad to note here that this work was also possible because Sir Purshottamdas Thakurdas financed it. We stress these facts as we feel that for furtherance of research in medical and health matters, it is absolutely necessary to obtain a well planned co-operation from many sides. Neither the Gujarat Research Society with its comparatively strained finances, nor a few scattered medical men without proper guidance and planning can carry out research. It is incumbent on the members of the Medical sub-committee to prepare, after careful consideration, schemes of research. It is more essential to find the right type of

young men and women to carry it out under proper supervision and with due help from the senior members. If both these are available, it is the bounden duty of the public to provide the necessary funds. That the Society has been able to do some work is a tribute to the research workers, not only in medical and health subjects, but also in subjects like ancient History and Culture, Anthropological research, Linguistic research, Psychological studies, Planning of Irrigation and Roads, and Economic studies. That the publication of these has been possible is due to the munificence of some Gujarati philanthropists.

This work will require, however, much larger sums of money as a beginning only has been made. Much more planning requires to be done. For the development of Maha-Gujarat which includes Gujarat, Saurashtra and Cutch, a planned study of all aspects will be necessary.

Reverting to medical and health aspects, the Society has experimented with the running of health centres in Bombay and Khar. This has not yet taken root. We feel that much more propaganda, regarding the preventive value of such health centres in addition to their research and medical values, is necessary. This will require much thought and planning. Health centres are in the air, the United Kingdom is establishing a large number. They already have successfully experimented and are running excellent Health Centres where units of 2,000 families or thereabouts are enrolled. Great sympathy is being experienced for this idea all over Gujarat ; but, unless considerable spade work is done, they will not succeed. The Government of Bombay have recognised the work of the Society by granting Rs. 4,000 this year for work on nutritional status in comparable groups on an all community basis. We hope to undertake this work during this year.

The Medical sub-committee has prepared a scheme of research on the digestibility of cooked foods. This work will require about 2 years till conclusions can be drawn. It has been the custom to consider certain cooked foods as easily digestible and others as the opposite or particularly harmful. No controlled work has been done to prove these contentions. Dr. J. D. Pathak the Secretary of the Medical sub-committee and Professor of Physiology at the Topiwalla N. M. College has prepared the scheme and has undertaken to supervise the work if the scheme is sanctioned and a grant obtained.

Many other problems can be tackled and are awaiting a more consolidated programme of work. The Society has been sorely handicapped for want of headquarters. If and when it is housed in a specially equipped place with facilities for some laboratory work much more will be possible. Mr. P. G. Shah who has striven hard for the Society and has brought it up to its present level has been pleading for a National Biometric plan for providing a continuous health survey of the population and determining its index from time to time. Such work can be started for Maha-Gujarat if there is a demand for it.

B. B. YODH,
Chairman, Medical Sub-Committee.

MEDICAL AND HEALTH PROBLEMS OF MAHAGUJARAT

By

DR. JIVRAJ N. MEHTA

[The following article from the pen of Dr. Jivraj Mehta, the veteran Administrator-doctor, after his assumption of office as the Dewan of Baroda derives special importance. Even though the opinions expressed are in no way connected with his present official position or his last one as Secretary, Ministry of Health Government of India and Director General of Health Services, they signify the working of a patriotic mind anxious and determined to secure the maximum good of the maximum number. Most of the views were presented to a Maha Gujarat audience—the Medical Conference at Rajot in March 1948—Editors.]

The dawn of freedom in India has increased our responsibilities as well opportunities for attending to the problems of public health and human efficiency in our country. I welcome this effort of the Gujarat Research Society and its Medical Sub-Committee to focus attention to these problems for one important region.

2. The part of western India known as, Cutch, Kathiawar and Gujarat is undergoing today a transformation of great importance which may result in the emergence of a politically homogenous structure, which should help to promote social, economic and cultural developments of a far-reaching nature in the coming years. The medical profession has also a share to contribute towards this task of moulding the life of the community in a manner designed to improve the health, happiness and productive capacity of the individual. In attempting to do so, I feel that, this profession will have to take a broader view than in the past, of their duties and responsibilities towards the public not only in preventing ill-health and affording relief to those who are sick, but also in assisting the people to live a fuller and richer life through an integrated functioning of their physical, mental and emotional faculties. These varied duties can be performed by the medical man only when he combines in himself a high standard of professional attainment with a cultural background rich in the knowledge of men and of affairs.

3. That the health problems of a region cannot be solved single-handed by the Medical man has been abundantly proved by the Bhore committee report on Health Survey and Development. This report has laid down definite aims and targets for achievements for each region based on its population and it is not difficult to work out the requirements of the regions conprised in the eventual unit Maha-Gujarat. But the immensity of the problem cannot be realised without a perusal of this report. The environmental difficulties have to be overcome first, problems of roads and

communications, water supply, drainage, and public health engineering have to be solved before an effective improvement in personal hygiene can be secured. A much larger number of trained staff of doctors, technicians and nurses has to be secured after years of planned and co-ordinated work. Such work should be easier in a compact and homogenous cultural unit like Mahagujarat even though the political units of Gujarat, Sourashtra, Baroda and Cutch may remain separate. The linguistic and cultural ties will make the regional approach easier, quicker and effective ; if the medical and public health programmes are conceived and executed for the region as a whole. The newspapers, the periodicals and the radio will take the message of health and physical efficiency much quicker, if the programmes are organised through a central organisation like a National Health trust. I wish success to the Gujarat Research Society in the formation of such an organisation. Today I will emphasise the work before the Medical men, functioning either through a voluntary health trust or through a state-controlled organisation, certain aspects of what I consider their essential functions.

4. In the past the emphasis has been on the provision of adequate facilities for the diagnosis and treatment of disease rather than on preventive health work. The basic need for expanding treatment facilities will no doubt continue, and, in present-day India, with the acuteness and extent of its morbidity, problem and the extreme inadequacy of existing arrangements, it is obvious that a marked advance in this field must form an important part of the country's health programme. The complexity of modern medical practice has made it necessary to have, in an appreciable proportion of cases, laboratory, consultant and specialist services for diagnosis and treatment. In America and elsewhere the development of "group practice" by a body of medical men has taken place in order to meet this need. In Great Britain the new National Health Scheme will provide for the establishment of Health Centres where all such facilities will be made available by the State to all the doctors working under the scheme. In India Governments will have to make themselves responsible for the provision of these facilities if the requirements of its large and scattered population are to be met.

5. Side by side with such developments in the curative field a parallel expansion of preventive health services is equally necessary. Without it existing sickness and mortality rates can hardly be reduced to any marked extent. A preventive service dealing with the control of insect vectors of diseases such as mosquitoes, flies, fleas and lice, improvements in environmental hygiene so as to provide safe water supplies and better housing and sanitary conditions and the provision of adequate nutrition will probably reduce sickness and death by well over 50 per cent.

6. In India the most urgent need is to carry medical aid and preventive care, as much as possible to the rural population, who are numerically six or seven times more than the inhabitants of urban centres and who have been greatly neglected in the past.

7. While medical men and women will no doubt form the backbone of a national health service we must remember that the part which non-medical men can play is continually expanding. Control measures against insect pests, sterilisation of water supplies and preventive inoculation, for instance, can be carried out effectively by non-medical workers with appropriate training and with adequate supervision. Similarly, in the field of medical research, is being increasingly recognised that team work is essential and the medical man is finding that highly trained scientists in other fields, e. g., biochemists, entomologists, cytologists and statisticians are as necessary as himself for a coordinated attack on the problems of health and disease.

8. Apart from the provision of adequate medical care, curative and preventive, there should be a sustained effort to train the individual in the hygienic mode of life and to assist him or her to develop an integrated personality designed to promote continual adjustment to the stress and strain of daily life. This prog-amme of education, while it is to be sedulously pursued in a manner to influence every section of the community and persons at all ages, will be particularly productive of results in the case of children in the formative years of their life and, in such a scheme of education, attention will naturaly concentrate on mothers and children. Maternity and child welfare activities and school health work, particularly their preventive and educational aspects, must therefore assume a degree of importance hitherto unrecognised in the health administration of the country.

9. It is clear that the duties which the doctor of the future will be called upon to perform will increase in scope and change in quality. In addition to the carrying out of curative and preventive measures in respect of the sick and the convalescent, he will find himself increasingly concerned with the healthy members of the community also. "Medical supervision of work and play, of the food that people eat, of public provision for rest and recuperation as well as periodical medical examination and the rectification of faulty modes of life will be some of the many new duties that the physician of the future will be called upon to undertake." Professor Henry E. Sigerist has well described the physician of tomorrow in the following words :—

"Scientist and social worker, ready to cooperate in teamwork, in close touch with people he disinterestedly serves, a friend and leader, he directs all his efforts towards the prevention of disease and becomes a therapist where prevention has broken down, the social physician protecting the people and guiding them to a healthier and happier life."

10. This brief discussion indicates the need for a wider conception of health service than in the past. If we are to accept, as is the trend in other countries, that adequate health protection is one of the "national minima" which the citizens have the right to demand from Governments, it is clear that a wide expansion of curative and preventive health service will be necessary and that such expansion

must particularly take note of the needs of the rural population. In the past, owing to a variety of causes which include lack of amenities and inadequacy of educational facilities for children, health workers of all type, medical and non-medical, have been unwilling to go to the rural areas. Every effort will therefore have to be made to induce these workers to cater to the needs of the rural population. Another factor to reckon with is that the doctor in the rural areas will have to combine within himself both curative and preventive functions if he is to discharge his duties satisfactorily. It is the practice in India and other countries to prohibit private practice in respect of medical officers employed on preventive health work. It will therefore seem to be likely that the rural health service that will be developed in the future will consist of wholetime salaried medical officers who will be prevented from taking up private practice and will, at the same time, be given adequate scales of pay.

11. If, as is envisaged, the State should make itself responsible for a well developed health service serving all sections of the community throughout the country it seems natural to conclude that, eventually, an independent medical profession will hardly have a chance to survive. This does not mean that initiative and enterprise need be killed in a State-controlled organisation of the type we are envisaging. The fear is widely entertained that the security of tenure and graded system of promotion which public service provides may lead to an impairment of efficiency. The only way of counteracting such a tendency would be for the State to regulate the conditions of service in such a manner as to emphasise efficiency as the sole criterion for promotion in order to provide the necessary stimulus for good work. It may also be pointed out that the provision of facilities for study tours and for research as well as a system of awards in public recognition of sound work will help to ensure that stagnation as the result of apathy is reduced to the minimum. The advantages of a socialised medical service for the community are (a) the provision of equal attention to the rich and the poor alike ; (b) the creation of an integrated curative and preventive service ; (c) extension of health services to sparsely populated regions which prove unattractive to private practitioners and (d) the training of medical men and other health personnel in numbers sufficient to meet the requirements of the country and not in the haphazard manner in which it takes place today.

12. This is the long term picture, as I conceive it, of the health organisation that will eventually come into being in the country. In the immediate future, while it would seem desirable to establish, as far as possible, a full-time salaried service with prohibition of private practice for the rural areas, utilisation of part-time and honorary workers from existing private practitioners in the State health organisation is evidently desirable, particularly in the larger towns and cities. As the State health services expand, increasing numbers of these private practitioners are bound to get absorbed into public service. The development of an efficient and contented state of health service will of course depend on adequate emoluments

being given to the staff, these being sufficient to attract to the medical profession intelligent men and women in competition with other services, industry and various sources of employment.

13. It may be emphasised that the medical man of the future will have to be a person with a wide range of culture if he is to fulfil his functions adequately and if he is to be a social physician to lead the people to a healthier and happier life. He may not be able to amass large incomes as some of the leaders of the profession do today. He should, however, be assured of a comfortable salary and will be free from the anxieties of the early years of struggle in a world of ruthless competition. In a well-developed health organization of the type we envisage the incentive for good work will arise not from the possibility or building up a huge bank balance but from that of advancing his professional and cultural interests through a variety of avenues for study, research and constructive work which the newer and expanding conceptions of a modern health service will provide.

14. In conclusion, let me appeal to the socially minded administrators and the public to lend support to the efforts of such medical men who are bent on constructive health work either by research or social planning. With the dawn of freedom in the country, our medical education and practices will attain more indigenous, though not less scientific, character: and I have no doubt that the strains of charity and goodwill inherent in our medical men will find greater opportunities in the new set up for giving intelligent and sympathetic co-operation in the solution of the health problems of the mother country.

REPORT OF THE HEALTH CENTRES MAINTAINED BY GUJARAT RESEARCH SOCIETY*

By

DR. J. D. PATHAK, M.D.

The health centre movement was initiated at the time of the 10th Anniversary celebrations of Gujarat Research Society in November, 1946, as a combination of its research and health promotion activities. It was a part of the "National Biometric Plan" proposed by Mr. P. G. Shah, Vice-President, Gujarat Research Society. This plan envisages a country-wide movement with central, provincial and district units for continuous work of health and nutrition surveys of the people. The health centres in the cities were to from a initial nuclei from which would shoot out workers for village work. Besides working as a centre for cultivating interest in health and physical fitness it was expected to carry out health surveys of families and advise members as regards the disorders found during the course of investigations ; to investigate their diet and point out the deficiency and to determine their normal standard of health and growth for various communities. The object of such continuous service was to produce evidence to show whether the nation as a whole or groups of persons within the nation showed progressive improvement or deterioration in their health.

The first health centre was opened in the consulting rooms of Dr. J. G. Parekh, Queen's Road, Bombay, on 1st November 1946 ; and the second in the rooms of Dr. Kantawala, 10th Road, Khar, on 1st April 1947. In this report in future, the former is referred as Centre A and the latter as Centre B. Each centre worked under a highly qualified physician assisted by a lady doctor, pathologist, health visitor and other staff. The work reviewed in this report was carried out at Centre A by Dr. J. G. Parekh, M.R.C.P., Dr. N. M. Shah, M.D., M.R.C.P., and Dr. Miss Nanavati, M.D., and at Centre B by Dr. S.C. Sheth, M.D. and Dr. Kantawala, M.B.B.S. Both the centres have subsequently been visited by Dr. M. D. D. Gilder, Minister of Health, Bombay, who expressed great satisfaction about the work carried out at these centres.

The centres were open to members of all communities ; but only whole families and not individuals were allowed to enrol as members. It was amply advertised that the membership was free of any charges. Yet sufficient interest was not forthcoming. Perhaps, because one was afraid of inviting suspicion of disease when he was able to move about and do his duties. Further it is well known that the health-

*This report is prepared by Dr. J. D. Pathak and is based on the detailed work conducted under the supervision of Dr. J. G. Parekh by Dr. N. M. Shah and Dr. Miss Nanavati, and under the supervision of Dr. S. C. Seth by Dr. S. C. Kantawala.—*Editor.*

mindedness is very poor in India. It was not infrequent to find that persons refused to turn up even after giving appointment (and even if they did they visited out of schedule hours). In view of similar experience met with by physicians in Bombay, too much importance was not attached to such lapses. After experience of six months' work in Centre A, on a free basis, the service was offered on basis of a small payment of Rs. 10 as fees for physical and laboratory examination including investigation of blood and urine for a whole family whatever its size. Even now the number of families agreeing to join remained small. From this experience it was decided to continue the work on a non-payment basis in a suburb. So another Centre B was opened at Khar where more homogeneous population of all communities was expected to be available. The opening ceremony at Khar was performed with due advertisement at a big public meeting where Dr. K. S. Mhaskar, Dr. B. B. Yodh and Dr. S. C. Sheth explained the scheme and its benefits; medical and health films were exhibited on the occasion, with the help of the American Military in Bombay. The centre attracted considerable attention and with the help of lady doctors and health visitors became quite popular. Subsequently, however, the health enthusiasm has slackened and activity is much reduced.

The experience of eighteen months' work cannot be considered disappointing in view of the novel nature of these experiments. The offer of a paid health service at the Pioneer Health Centre Peckham, London, intended to be run on a pattern of a family health club with periodical health overhaul for all members and with various auxiliary services like child welfare and maternity centre, immunity centre, etc. took many years to take root. In the beginning, even at Peckham, the plan of mere health overhaul did not succeed "as such periodic overhaul accompanied by early treatment of disorder was of little use as it was unaccompanied by measures to modify the environment in which the disorder had resulted." The centre flourished only after a fully equipped modern club with facilities for games, theatre for drama, cinema and music, library, cafeteria etc., providing full social life to the members attached to it. In India, with overwhelming poverty and ignorance the health service will take much time before it gets a firm root. Mere health examination and advice are not sufficient to attract even enlightened families to join. The centres are likely to become more popular if they are associated with clubs as at Peckham or if they provide facilities for treatment of its members either at the centres or elsewhere on nominal fee. There is considerable scope of this type of work in residential institutions like sanatoria where families come for change of climate on health grounds.

The usefulness of such health promotion centre is however, now getting recognised as a part of their programmes in preventive medicine and the municipalities of Bombay and Ahmedabad have under their consideration health centre activities. The Government of Bombay has recognised this society's health centre as Nutrition Research Centre and has issued orders giving financial support to widen the scope and utility of the work undertaken by this society.

Procedure : The members of the family joining the centre were called at an appointed time and subjected to a thorough clinical examination. Their blood was taken for hæmoglobin, total counts and grouping. Their urine was also examined. Facilities for stool examination were provided but most of the members did not avail of this investigation. The members filled in the form of the enquiry in collaboration with the staff at the centre. The enquiry included the name, age, sex, address, family history, history of hereditary diseases, diseases previously suffered from, working and housing conditions, exercise, hobbies, recreation, and financial state. Also a detailed dietary history was obtained.

The results of the data so gathered have been put forth here. The families were subsequently acquainted of the findings and were advised to take treatment from their family doctor for any abnormalities detected during the course of investigation, and make necessary correction in their diet, mode of living, or occupation, as necessary. Each member was examined once only. A second overhaul was intended but could not be executed, except in a few cases.

Results : The centres have been working as cosmopolitan institutions and members of all communities were invited to join and take advantage of the facilities offered ; but as health mindedness is a rare virtue, the voluntary attendance was small. It required a certain amount of persuasion and coaxing before the whole family attended, and these families happened to be of the Hindu community.

Communities.	No. of Persons Examined.		
	Centre A	Centre B	Total
Hindus :			
Gujaratis	379	360	739
Deccanis	..	62	62
Muslims	..	4	4
Parsis	1	..	1
Christians	..	10	10
			816

Most of the members were educated upper middle class families. They were all healthy—in the ordinary sense of the term, but if an occasional member of the family was suffering from chronic or any other illness the whole family including that member was examined. Since these families were not confronted with economic problems of lower middle or poor class people and since they were well educated one would rightly expect the best physical and cultural development in

them. Their state of health therefore is more indicative than representative. A study on similar lines of the health and nutrition of poorer classes would bear this out.

Incidence of age and sex.—The distribution of their age and sex is as follows (Fig. I) :—

Yrs.	Males.			Females.			Grand Total
	Centre A	Centre B	Total	Centre A	Centre B	Total	
1-10	36	60	96	29	53	82	178
11-20	41	63	104	47	38	85	189
21-30	33	40	73	46	45	91	164
31-40	35	32	67	35	34	69	136
41-50	32	23	55	13	18	31	86
51-60	21	12	33	3	7	10	43
61-70	7	9	16	1	1	2	18
71-80	1	1	2	1	0	1	3
	205	240	445	175	196	371	816

In this investigation out of the total 816 persons examined 245 were adult males, 204 adult females and 367 were persons under 20. Out of the adults 300 were of the age group 21-40, and 129 of the age group 41-60. It is significant the persons of the age groups 61-80, who had evidently sufficient leisure, and who attended the Health centres as a part of the families which they led, numbered merely twenty-one.

This is in agreement with the figures of the general census. It reflects the poor longevity of our people as well as the high incidence of birth rate. The average expectation of life at birth in British India is 26.56 years, in Great Britain 59.58 years and in U. S. A. 62.67 years. In America the majority of the population is above middle age due to the low birth rate and increased longevity of the people. Here the majority are of younger age due to high birth and early death rate prevailing in this country.

Occupation.—In this series, there were 54 children below the age of 5. All between the ages of 5-15 (excepting domestic servants) were students. *Literacy* in the younger generation in this sample was almost cent per cent. In adults, the males mostly were men engaged in business, profession or service, lawyers, doctors, teachers clerks, or businessmen with more or less sedentary occupations. Only 19 men, *i.e.*, 2.3 per cent were engaged in jobs necessitating a little hard work. Out of 278 adult males, 53 did only domestic or no work, 206 followed sedentary occupations and 19 were engaged in moderately hard work. Out of the 203 adult females, 193 did only domestic or no work, and 10 were engaged in sedentary service

whereas none was engaged in a job which could be classed as hard work (Fig. II). Eve in their domestic work they were assisted by their servants. Almost all of persons examined had no particular hobbies, nor did they play any games or take the regular exercise.

Physical Development.—The several methods adopted to assess the degree of nutrition of an individual may be briefly classified as under: (1) Comparison with standard measurement as height, weight, chest measurements, (2) Clinical examination, (3) Physical Efficiency test, (4) Laboratory tests as that for Hb, R.B.C. urine examination and specialised tests as dark adaptation test for vitamin A, vitamin C excretion in urine, etc. No single method is perfect but a combination of all methods yields the best results. For mass work, however, estimation of height and weight and good clinical examination are satisfactory and these have been employed here.

Height and Weight.—The standard tables for heights and weights for different communities of this country are not reliably compiled so far and one of the objects of the "National Biometric Plan" sponsored by this Society is to secure reliable data on the subject. The Oriental Life Assurance Company has published tables for Indians in which a table for adult Hindus of Bombay Presidency is given. Our results have been compared with the averages given in this table.

For children for want of reliable standard tables of our people the comparison was made with the standard heights and weights of Americans.

Height.—The average figures of adult male height as adopted in the Oriental Company's report are:—

Bombay Presidency:	Christians	5′-6″
	Parsis	5′-5.6″
	Muslims	5′-5.6″
	Hindus	5′-4.6″
Average (mostly Gujaratis) of the series		5′-4.5″
Hindus of the Punjab		5′-5.7″
Americans (acc. to Barach)		5′-9″

The average Gujarati appears to be shorter than many other Indians and it is a problem to be solved whether this is due to a racial peculiarity which cannot be altered by suitable changes in diet and habits of life.

Racial peculiarity and nutrition in young age contribute more than all other factors in determining the adult height. The part played by nutrition in young age is immense. The adult height of Russians or Japanese migrated to America has increased in the course of a generation by change in diet. Better nutrition can do the same for our heights.

Average female height in this series if 5′- 0.5″. The figure of average Indian female (Gujarati) height is not available. Average American adult female height is 5′-5″. The females of this series mostly Gujaratis are stunted in their comparison.

Weight is a good indication of the state of nutrition of a person who has no clinical disorder. Emerson, U. S. A., classifies the state of nutrition from point of weight as follows :—

1.	Weight below	10 per cent.	faulty nutrition.	
2.	Weight upto	plus 10 per cent.	fair	normal
3.	Weight upto	plus 20 per cent.	good	normal
4.	Weight over	plus 20 per cent.	obesity	

A comparison of the weights of adults examined with average weights of Hindus of Bombay Presidency (Oriental Insurance Company's figures), has been shown in tabular form below though it must be recognised that the Oriental figures are much below the American averages (Fig. III) :—

Sex and Age.	Subnormal	Normal	Obese.	Total.
	Below 10 per cent.	Minus 10 to plus 20 per cent.	Above plus 20 per cent.	
Adult males above 20 ..	63	171	12	246
Adult females above 20 ..	39	154	11	204

No reliable standard tables for children (Gujarati) are available. Comparing their heights and weights with those of American children, almost all of them are below the American standard. Children of today will be adults of tomorrow. Dr. Chamanlal Mehta has recently shown that in the case of certain Bombay City Maternity Hospitals there is a progressive fall in the weight and size of Gujarati children at birth. Such a state of affairs does not prognosticate a bright future.

Other Normals.—Pulse, temperature and respirations were noted as a routine. Omitting the obviously abnormal findings the averages in this series are as follows :—

———	Rate of Pulse.		Respirations per minute.	
Age.	Male.	Female.	Male	Female.
9-12 ..	93	84	19	21
13-15 ..	80	85	20	20.8
16-20 ..	81.3	84.5	19.5	18.7
21-30 ..	81.9	84	19.3	19.5
31-40 ..	86.2	80	20	19.1
41-50 ..	81	84	19.5	19
51-60 ..	81	81	19	19
61 onwards	80	80	19.7	20

Past Illnesses.—There were very few who had never been ill at all. Enquiry was made regarding the major illness suffered from previously.

Centre A.	Centre B	
64%	67%	Gave history of one or more illnesses in the past
and 36%	33%	(average 34.5%) Did not give history of any major illness in the past.

The incidence of their past illnesses is shown below (Fig. IV) :—

Disease.	Percentage of Members.		
	At Centre A	At Centre B	Average Percentage
Typhoid (enteric fevers)	14.2%	16.2%	15.2%
Dysentery	14	4.6	9.3
Small-pox	8.2	4.6	6.4
Infectious fevers (whooping cough, etc.) ..	4	4.7	4.53
Other fevers (malaria, etc.)	4	6	5
Rheumatic fever	....	1.6	0.8
Pneumonias	4.6	3.4	4
Asthma	3.8	1.6	2.7
Respiratory diseases coughs and colds ..	3.5	3.9	3.7
Jaundice	2.4	2.4	2.4
Sprue	1.9	0.46	1.2
Worms	1.1	0.6	0.85
Tonsillitis	1	0.5	0.75
Venereal diseases	0.46	0.23	0.34
Severe anaemia	....	1	0.5

Incidence of typhoid and dysenteries is an index of sanitary conditions. These diseases top the list. In Bombay enteric fever is endemic and it seems that the disease is on the increase both as regards its prevalence and severity. Typhoid, dysentery, small-pox, infectious fevers, malaria, venereal diseases—are preventable diseases. There is great scope for improvement. If better sanitary measures were instituted most of the preventable diseases would be wiped out and a great proportion of early death and disabilities could be removed.

Present Complaints.—To the query " any complaints? " the response obtained was—

At Centre A	At Centre B	
45.6%	34.8%	(average 40.7%) replied they had no complaints;
whereas 54.4%	65.2%	(average 59.3%) complained of some disorder.

Their chief complaints in order of their frequency were :—.

1. Headache, 2. Pain in abdomen, 3. Constipation, 4. General Weakness, 5. Frequent colds and coughs, 6. Indigestion, 7. Backache, 8. Menstrual troubles, 9. Pain in the chest, 10. Diarrhoea, 11. Piles, 12. Skin, 13. Eye, 14. Ear troubles, or 15. Urinary disturbances.

These complaints were borne in mind at the time of their clinical examination which revealed disorders of different systems as follows (Fig. V) :—

Name of the Disordered System.	Out of Total Number of		
	349 males %	289 females %	175 children (below the age of 10) examined %
Ear, Nose, Throat	30.2%	21.6%	20%
Teeth and Gums	16.1	21.6	8
Eyes (including errors of refractions) ..	13.4	10.6	1.9
Digestive	12.1	11	3.3
Blood pressure	8.9	3.9	....
Skin	10.7	7.2	5.2
Respiratory	9	1.8	1.9
Cardiovascular	2.2	1.5	....
Nervous	2.2	3.7	1.4
Urogenital	9	13.6	8
Urine	3	3.6	0.5

As a general rule the adult males had more disorders than females. Thus a large number of people went about with bad throats, tonsils, gums and teeth. In children, enlarged tonsils, was the most common finding. Recurrent stomatites was fairly frequent. The incidence of caries of teeth was not as high as in Western countries. Yet proper examination in schools and institution of proper dental and throat hygiene would eliminate most of these troubles and raise the standard of their health.

Eyes.—Errors of refraction were common. It is necessary that weak eyes should go with better education ?

Digestion.—Digestive troubles were frequent enough. The actual poverty of digestion experienced by most in Bombay could not be recorded with exactness. In this city hunger and appetite hardly ever guide the intake of food. Most of the people eat mechanically, regulated by the hands of a clock.

Skin.—Itching was frequent. This was attributed by some individuals to the quality of food distributed through the ration shops, but it is difficult to associate this symptom with the food taken.

Blood Pressure.—The incidence of hypertension was studied more closely. It was heaviest in 41-60 group. It was thrice as common in males as in females. The physical and mental strain of the active professional or business life of men working in Bombay city, as contrasted with the pacific domestic life of the women, may be a probable factor of its greater frequency in men.

Age.	Number affected with High Blood Pressure	
	Males.	Females
21-30	2	1
31-40	3	1
41-50	9	4
51-60	7	4
61-70	6	....
71-80	1	....
	28	10

Blood—was examined for hæmoglobin, red blood cell, white cell count and grouping. Smear examination was made only in some selected cases. Total number of blood examinations made was 534.

Haemoglobin was estimated by Sahli's method. Out of 534 blood examinations,

303	showed	haemoglobin	above	90	per cent.
145	,,	,,	between	81-90	,, ,,
58	,,	,,	,,	71-80	,, ,,
22	,,	,,	,,	61-70	,, ,,
2	,,	,,	,,	51-60	,, ,,
4	,,	,,	,,	41-50	,, ,,
Total 534					

Taking all below 80 per cent as abnormal, 15 per cent of the persons examined suffered from anæmia.

Blood groups—were determined in 493 persons. The distribution of groups is as follows :—

	ABI	A2	B3	O4	Total.
Number	35	93	142	223	493
Expressed in percentage	7.1%	18.8%	28.8%	45.2%	100%
Groups distribution in Europeans	2	40	15	43	100

In European nations O and A are most common groups ; in Indians and other Orientals O and B are more frequent. AB is the least common.

A special study of the serological characteristics of the various races inhabiting Maha-Gujarat has been made by Dr. D. N. Majumdar. Its results are published in January 1948 Journal of Gujarat Research Society. It is sufficient to record here that no deviation from the laws of inheritance of blood groups was detected in these five hundred cases. This is a remarkable testimony to the constancy of the blood groups in these families.

The Status of Health.—The status of health of these "healthy families" is far from satisfactory. It is difficult to define health. It is not mere absence of disease but it is a positive quality. Prof. Cathcart defines health as "a general state of well being that characterises a person who is physically and psychologically sound." The signs of health have seldom been scientifically analysed nor have any standard for its measurements been fixed up. In this series those who had no disability as a result of present or past illness or had no physical complaints or presented any abnormal clinical or pathological findings have been classed as healthy.

Out of 816 persons examined 751, *i.e.*, 92% presented some disorders or complaint. Only 65, *i.e.*, 8% suffered from no disorder. It does not necessarily follow that those without disorders were healthy in the true sense of the term. At Peckham Health Centre, London, out of 3,911 persons examined 358, *i.e.*, 9.1 per cent presented no disorder.

Nutrition.—The original intention was that the exact food was to be weighed by a trained health visitor and recorded by the health visitor and in some cases by the families who were given direct instructions for detailed work. But this could not be done in all cases, and the diet was measured in some cases. The data provided by the families at centre A were not very reliable as they gave approximate estimates. The results of the two centres are therefore presented separately. Even from the data of centre B many records of doubtful accuracy had to be discarded after scrutiny.

It is worth while discussing some of the difficulties experienced in estimating the food values of diet consumed by the members. The measurements of the food given for cooking were recorded but the food wasted in the process of cooking and in the plate after serving could not be measured. It is customary to make an allowance of 10 per cent for wastage though it may be doubted if this allowance was at all reached in the days of rationing.

The food values of the diet have been taken from the tables prepared by Aykroyd (Health Bulletin No. 23, or pamphlet No. 4 of Gujarat Research Society). In calculating the food values of the diet of institutions like hostels, little difficulty is experienced, as all the members are usually adults belonging to the same age group.

In estimating the diet of families the matter is different as the age in each family varies in wide range and the diet of each family or its members varies considerably both in quality and quantity. To obviate this difficulty, for estimating the food of a family, a man value or coefficient is fixed up and different coefficients are assigned to different ages, namely, adult man above 14 years 1 ; female above 14 years 0.8 ; 12 to 13 years 0.8 ; 10 to 11 years 0.7 ; 6 to 7 years 0.5 ; 4 to 5 years 0.4.

The results of each survey are to be interpreted in the light of coefficients employed. These coefficients are absolutely arbitrary and many scales have been suggested. Mottram and Grahman remark that "there are altogether about 38 different scales and that the particular scale used may determine the adequacy or inadequacy of the diet." These coefficients are true for calories only. Children need more protective foods. The coefficient would therefore differ for every item of nutrient, namely, proteins, calcium, iron, vitamins, etc. The Technical Commission of Health Committee of the League of Nations has recently recommended the following scales :—

							Boy	Girl	Girl	Boy	Adult Man or Woman
Age	1-2,	2-3,	3-5,	6-7,	7-9,	9-11,	11-12,	11-12,	12,	12	
Coefficient ..	.3,	.4,	.5,	.6,	.87,	.97,	1.07,	1.23,	1.17,	1.33,	1

Estimated according to this new scale the food value of the diet of adult male in our series would be reduced by 30 per cent.

All ghee vegetable or otherwise consumed is recorded under pure ghee. The Vanaspati brand contains hardly any vitamin A. Vitamin content of ghee varies from sample to sample. In calculating, the ghee used here is presumed to contain 10,000 units of vitamins A for 100 grammes.

There must be gross disproportion in the vitamin C actually consumed and calculated. Most of the families used soda for cooking, which destroys this vitamin. They have been advised not to use soda for cooking.

The vegetables were classified under leafy, non-leafy and tubers. In calculation spinach is taken to represent the leafy, ladies fingers the non-leafy, and potatoes the tubers. The food values and especially vitamin values may therefore not be exactly representing.

Menu.—Their routine daily food comprises (1) a simple cup of tea in the morning, followed by (2) early breakfast sometimes as early as 9 a.m. consisting of rice, dal vegetables, chapaties, with chatnee, pickles, etc. ; (3) an afternoon tea, alone or with some light food ; and (4) evening dinner consisting of puri or bhakri, milk and vegetables and perhaps rice, dal or curry. Fried articles like bhajis or other farsans prepared from gram flour are often taken in the afternoon or at one of the meals.

In most cases there is a long interval between the breakfast and dinner, as people have to hurry for their office early in the morning and return late in the evening. A change in this routine by shifting the lunch to a later hour as recommended in 'Arogya Patrika No. 4' of G. R. S. would go along way in preventing the feeling of tiredness experienced by many towards the end of the day. Most of the families were vegetarians. The only non-vegetarian item consumed by them being milk which is taken in poor quantity.

The food values of the diet of adult man, *i.e.*, unit coefficient are shown in the following table. (See Figs. VI to IX.):—

	Proteins (gms.)	Fats (gms.)	Carbohydrates (gms.)	Calcium (gms.)	Iron (Mgm.)	Vitamins. A (Units)	Vitamins. B1 (Units)	Vitamins. C (Mg.)	Calories.
Centre A	66.2 (17.1 animal)	78.3	262	1.4	19	3382	371	75	2041
Centre B	52.68 (12.5 animal)	88.68	300.84	0.87	19.56	2311	348	110	2271
G.R.S. Enquiry of Mid. Class Diet —1941.	61.1 (6.96 animal)	82.63	385.6	0.74	34.8	1508	555	49.5	2550.7
Diet recommended by Nut. Res. Council U.S.A.	70	..	..	0.8	12	5000	400	70	3000

Calories.—The caloric value of diet per adult co-efficient was 2,041 at Centre A and 2,271 calories at Centre B. This is inadequate. Even for sedentary adults, the calories should not fall below 2,400 calories per day (Fig. VI).

Proteins are the only source of nitrogen and hence indispensable. They are necessary for growth, building the muscles and tissues and their repair. These proteins consist of simpler compounds, aminoacids. Since the aminoacids of animal proteins like milk, meat, eggs and fish resemble those of human tissues they are better suited for growth and are called first class proteins. The proteins of cereals are not so well suited for growth. They lack in some aminoacids which must be taken in the diet. The proteins of cereals are thus inferior and therefore called second class proteins.

There has been considerable controversy in the past as regards normal protein requirement. The figures have been fixed from observations on natural diets of men and from experiments on nitrogen balance. The general opinion of authorities is that 1 gm. of protein per kilo body weight should be taken by an adult every day; *i.e.*, 60-70 gm. per day. At Centre A 66·2 gms. and at Centre B 52·68 gms. of proteins were taken per unit coefficient (Fig. VII). Of the total proteins the first

class proteins should form a large share. Graham Lusk had estimated that 5% of the total calories of the diet should come from first class proteins of milk, curds, eggs, fish and meat. The Advisory Committee on Nutrition of the Ministry of Health, England, similarly recommended that 37 gms. first class proteins should be had by an adult per day. The army allowed even more than this amount. The milk and milk products are the only important source of first class protein in the dietary of vegetarians. 1 pint, *i.e.*, 20 ounces of milk gives approximately 20 gms. of first class protein. In this series, at Centre A 17.1 grms. and at Centre B, 12.5 grms. of animal protein was available per unit. Obviously the actual consumption of ladies and children, would be much less than this. The defective growth of children may be due more to this fault than any other factor. The lack of enthusiasm, energy, etc., can also be attributed to this defect.

Fats are adequately taken, mainly in the form of oils and ghee. Pure ghee is difficult to get. The difference between the animal and vegetable fat does not lie in the caloric value but in their vitamin contents. From animal experiments, there was a hot discussion in the press sometime back regarding the utility of vegetable ghee. It was claimed that animals became blind in their third generation when kept on vanaspati. If so, the dangers of vanaspati are obvious. Vitamin A content of the diets surveyed falls below the optimum recommended by the Nutrition Research Council, U. S. A. (Fig. VIII).

Vitamin B1 is very near the optimum recommended. But prolonged cooking and the use of soda which is commonly used by most of the families examined, are likely to destroy Vitamin B1 and C. Vitamin C is well supplied but is difficult to say how much of Vitamin C would be left in the dish after cooking. Recurrent stomatites indicates some deficiency of vitamin B complex. The malaise, tired feeling, depression of spirit so commonly complained of may have some relationship with this deficiency.

Salts. (Fig. IX)—Calcuim consumed is almost near the mark. But the main source of this calcium is from vegetables and not from milk, which is the best source of easily assimilable calcium. So also about iron, which is adequately taken, but not from a source whose iron is easily assimilable.

SUMMARY

1. The health and diet of 816 members of the middle class families who joined the health centres of Gujarat Research Society in 1946-47 are reviewed in this report. Generally families whose health was surveyed were healthy and normally active, though some members may have come with the sole idea of having a check up after a recent illness. The findings are therefore pointer to the state of health of the middle class population of Bombay, especially Gujaratis.

2. Most of the persons led sedentary life. The education index was almost cent per cent.

COMPARISON OF FOOD VALUES OF DIET OF ADULT MAN—UNIT

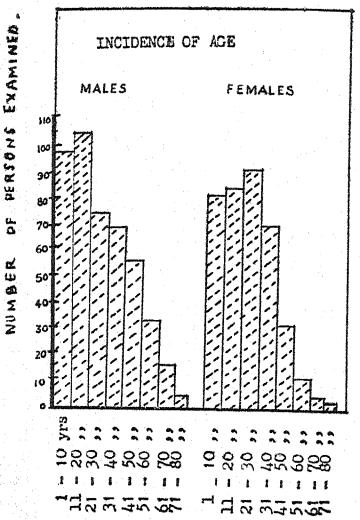

Fig. I

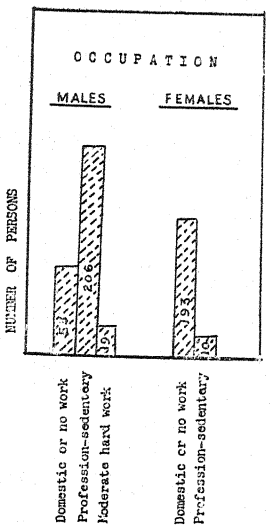

Fig. II

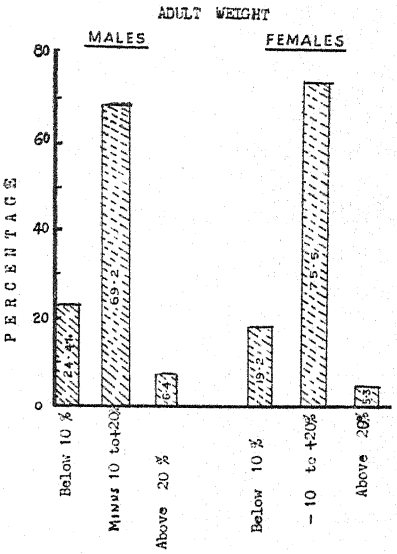

Fig. III—Weights

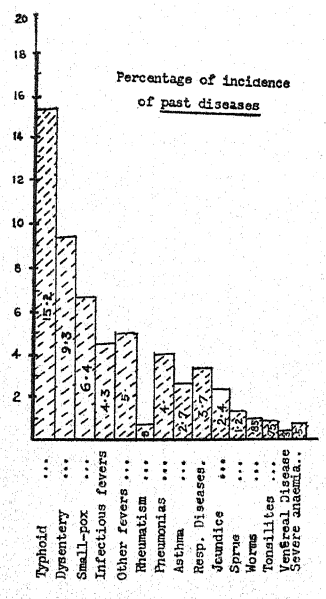

Fig. IV—Incidence of Past Illnesses

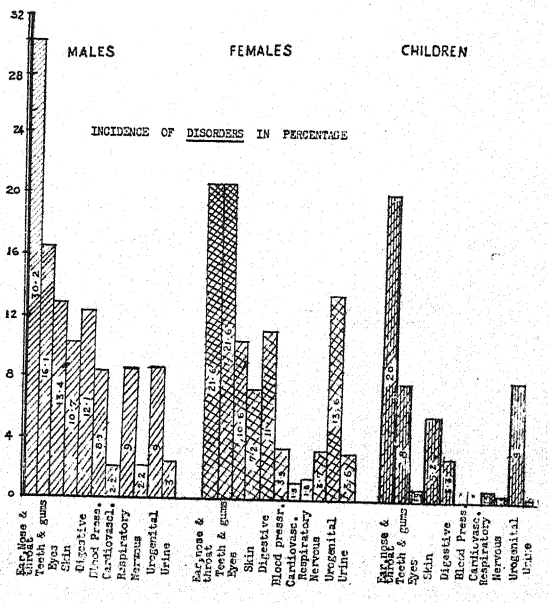

Fig. V—Incidence of Disorders

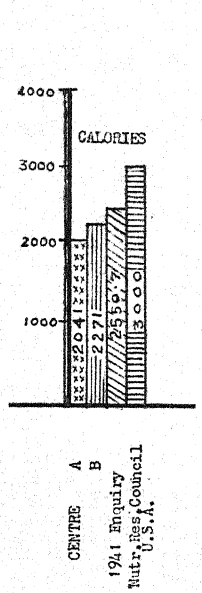

Fig. VI

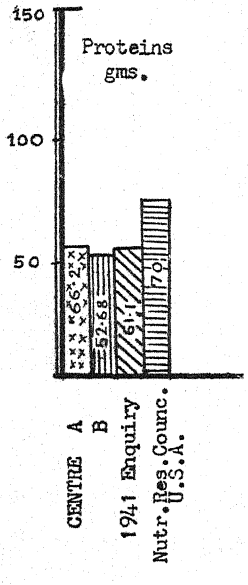

Fig. VII

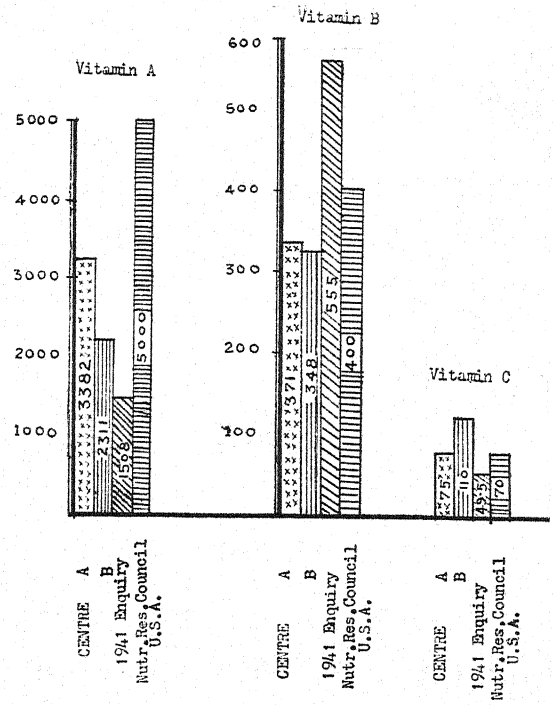

Fig. VIII—Vitamins A, B, C

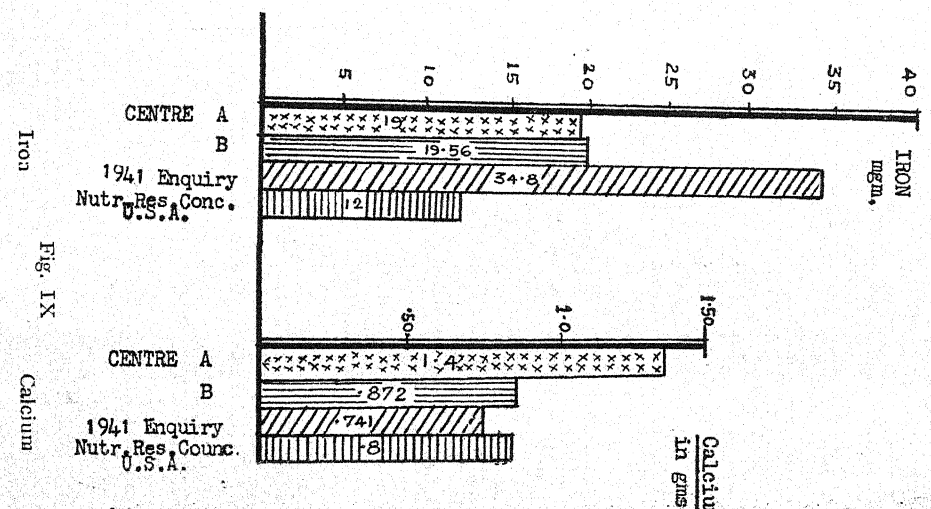

Fig. IX

Iron

Calcium

3. Average height of American men is 5'9" and of women is 5', 5". Average adult male height in this series was 5' 4.5" and female height 5', 0.5". Many were underweights and though it is difficult to generalise the females of the groups examined were less stunted.

4. (a) 67 per cent had suffered previously from some major illness.

(b) Incidence of typhoid, dysenteries and small pox was high.

(c) 60 per cent of the persons examined complained of some symptoms of which the most frequent were headaches, constipation, weakness, cold and coughs, backache, and menstrual troubles in females.

5. On examination, the throats, teeth and gums were the most unhealthy of all organs. The errors of refraction, digestion, blood pressure, and skin troubles, were next frequent disorders. 15 per cent of the members had anæmia.

6. Only 8 per cent were completely healthy.

7. The technical difficulties of a diet survey are discussed. The food values of diet, estimated have been represented here, in a tabular form, and their merits and demerits discussed.

8. The vegetarian Gujarati diet is faulty in many aspects. It is poor in calories and in animal proteins, for which more milk should be taken. It was deficient in vitamins A and B. Soda was used in cooking by many families. It is likely to destroy the vitamins B and C.

9. The health surveys initiated at these free health centres have proved that the middle class families are not health-minded even though their health is below normal. If health centres with facilities for maternity and child welfare with diagnostic laboratory conveniences and with periodical nutritional surveys, are provided at the cost of Government and Municipalities, they will help in raising strong and healthy families which form the foundation of the prosperity and efficiency of the nation.

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A STUDY IN THE CAUSES AND CHARACTERISTICS OF ANÆMIA IN GUJARATIS

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This report describes a clinical and hematological study of cases of anæmia amongst the Gujarati patients admitted in Sir H. N. Hospital, Bombay. The incidence, type, degree and etiological factors as well as the correlation between clinical hematological and biochemical findings were determined. This work was carried out at Sir Hurkisondas Hospital, Bombay, under the auspices of the Gujarat Research Society and with kind co-operation of the authorities of the hospital from June 46 to December 1947.

No selection was ordinarily made and the cases admitted for anæmia during this period were taken for study as far as possible. A thorough clinical history and detailed physical examination were done in each case. Routine and special hematological study was carried out, including Myelograms in each case. Besides this, Blood-Iron, Plasma-protein estimations, Kahn test of blood, Vanden-Berg reaction, Icterus Index, routine Urine, Stool examinations and Gastric analysis were carried out in most of the cases.

In all 152 cases were studied during this period :

(1) *Sex Incidence :*—86 were males and 66 were females, thus in this series 58% were males and 42% were females.

(2) *Age Incidence :*—

TABLE I

Age in Years.	No. of Cases	% Age Incidence
0-10	4	3
11-20	19	13
21-30	49	32
31-40	43	28
41-50	21	14
51-60	11	8
61-70	4	3
Over-70	1	0.6
Total ..	152	..

This table shows that maximum incidence of anæmia was between the ages of 21 to 40.

(3) *Occupation* :—

TABLE II

	Male Patients.	Cases No.	Female Patients.	Cases No.
1	Service as Clerks, Salesmen, Canvasser, Accountants, etc.	29	Students	5
2	Unemployed for 3 months ..	16	Serving as Cook	1
3	Retired Life	11	No occupation except household work	60
4	Goldsmith, Tailor, Carpenter, Sailor, Plumber, Fitter, Confectioner, etc.	8		
5	Small Business	7		
6	Students	6		
7	Teachers	3		
8	Brokers	3		
9	Domestic Service	2		
10	Farmer	1		
	Total	86	Total	66

(4) *Socio-economical Aspects and Diet of Patients* :—All the patients belonged to free general wards of the hospital. They belonged to lower middle class or poor class. It is very difficult to correlate the occurrence of anæmia with these factors unless one gets details about total income of all family members, money spent after diet per member and other individual economic aspects. As this was not done, effects of these factors cannot be correlated here.

All the patients were vegetarian. A detailed history about their intake of Protein, Carbohydrate, fat, etc., was teken and a rough estimation could be done from this. It was observed from this that 75% had poor diet from the view of quantity and quality. The chief diet consisted of wheat and jawar chapaties, polished rice, and the small quantity of milk or milk-products consumed was insignificant.

Clinical History :

(a) *Chief Complaints on Admission* :—The incidence of these is tabulated below in table No. III. This table shows that there are cases of anæmia where there are none or vague symptoms upto an advanced state. General weakness and sense of exhaustion and fatigue were the most frequent complaints. Loss of weight varied from 5 to 40 lbs. within 6 months. 71 patients complained of watery diarrhœa.

History of fatty sprue type stools was present only in 3 cases, suggesting a very low incidence of this syndrome in this series.

Duration of diarrhœa ranged from one month to six months. Total duration of other complaints ranged from 2 weeks to 2 years.

TABLE III

Complaints on Admission

	Complaints.	Number of of Cases.	Percentage Incidence.
1.	General Weakness	126	84
2.	Fatigue and Exhaustion	120	80
3.	Loss of Weight	120	80
4.	Stomatitis	90	60
5.	Loss of Appetite	89	60
6.	Diarrhoea	71	48
7.	Glossitis and Sore Tongue	49	32
8.	Dyspnea on Exertion	44	30
9.	Edema on Feet	39	26
10.	Flatulence	36	24
11.	Giddiness	32	22
12.	Burning in Throat	30	20
13.	Recent History of Bleeding	24	16
14.	Burning in Feet	13	8.6
15.	Mild Dysphagia	11	8
16.	Heaviness in Limbs	8	5.3
17.	Pain in Calf and Legs	5	3.3
18.	Jaundice	2	1.3
19.	Paralysis of Inferior Extremities	1	0.3

In many patients there were more than one complaints as seen from the above table.

(b) *Past Illness and History of Probable Causative Factors* :—History of past illness was taken in detail and is set out in table No. IV.

TABLE IV

	History for Probable Causative Factors.	Number of Cases.	Percentage Incidence.
1.	History of having 'fever' for more than a week within last three months	42	28
2.	History of having similar trouble in past ..	28	18
3.	History of Recent Bleeding :		
	(*a*) Bleeding Piles	18	12
	(*b*) Menorrhagia	8	5.3
4.	More than one delivery within last two years in female patients	18	12
5.	Chronic Diarrhoea	11	7.3
6.	History of Jaundice	8	5.3
7.	History of Syphilis	6	4
8.	History of Any Liver Disease, etc.	....	....
9.	History of Bone Infection	....	....
10.	No History of Any Previous Diseases	61	40

In some patients there was history of more than one disease in past.

(c) *History of Treatment Taken Prior to Admission in Hospital* :—The duration of illness varied from a few weeks to several months before patient sought admission to hospital. During this period they had some sort of treatment either oral or parentral, the exact nature of which was difficult to assess. 92 patients, *i.e.*, 60% had some anti-anæmia therapy out of which 31 patients, *i.e.*, 20% had parentral therapy with liver extract and vitamin B complex while 60 cases, *i.e.*, 40% definitely denied having taken any anti-anæmia therapy within 2 months before admission. Those who had oral therapy could not definitely tell what drugs they had.

Physical Examination Findings :

(a) *Skin Complexion* :—This was observed in each case and was grouped accordingly into chief four groups. Findings were also correlated with severity of anæmia. Table No. V gives the groups.

TABLE V

Incidence of Skin Complexion in Relation to R.B.C. and Hæmoglobin Range.

No.	Type of Skin Complexion.	No. of Cases.	Approx. Percentage.	R.B.C. Range in Millions.			Haemoglobin Range in Grams.			Apparent Therapeutic Deficiency.			
				Upto 2	2-4	4-5	Upto 7 gms.	7-14	14-17	Iron alone.	P.A. Factor.	Both P.A. and Iron.	Could not be determined.
1	Healthy Complexion.. ..	30	20	8	19	3	6	23	1	3	10	5	12
2	Pale Complexion	78	52	43	35	—	45	33	—	16	35	17	10
3	Yellowish and Lemon Yellowish Complexion	17	12	10	7	—	11	6	—	5	6	2	4
4	Earthy dark Complexion ..	27	18	19	8	—	17	10	—	2	16	7	2
	Total	152	—	80	69	3	79	72	1	26	67	31	28

It is seen from this table that Skin can show normal colour even though the R.B.C. count is below two million per cmm. and hæmoglobin below 7 gms. In this series, cases with R.B.C. count of 1·2 millions per cmm. and Hb. value of 2 gms. per 100 cc showed healthy normal skin. This shows that it is not always fair to judge the severity of anæmia on skin-colour alone. Similarly skin may look pale even though the count is as high as 4 million per cmm. and Hb. value 15 gms. per 100 cc. The corresponding therapeutic deficiencies in respective groups are correlated with skin findings. No definite inference can be drawn from this.

In considering chief therapeutic deficiency in a particular case, we have taken the criterion as follows :—All macrocytic anæmias with normosaturation are con-

sidered as if lacking from P. A. factor, while macrocytic anæmias with hyposaturation are included as if lacking from both, P. A. factor and Iron. Microcytic hyposaturation type are considered as if lacking from Iron, while normocytic or microcytic with normosaturation types are included under 'undetermined' group. In all these cases the chief therapeutic deficiency only was considered.

(b) *Nails*:—Changes in nail characteristics were studied. These are correlated with severity of Anæmia and probable therapeutic deficiency.

TABLE VI

Characteristics of Nails in Relation with R.B.C. and Hæmoglobin Range.

No.	Type of Nails.	No. of Cases.	%age Incidence.	Range of R.B.C. in millions.			Hb. Value Range in gms. per 100cc.			Type of Deficiency in the Group.			
				upto 2	2-4	4-5	upto 7	7-14	14-15	Iron Alone.	P.A. Factor.	Both P.A. & Iron.	Undetermined.
1	Pink	12	8	1	9	2	1	10	1	2	6	2	2
2	Pale	108	72	63	44	1	59	49	..	6	58	20	24
3	Pale & Flat ..	28	18	13	15	..	16	12	..	14	3	9	2
4	Spoon-shaped ..	4	2	3	1	..	3	1	..	4	..	..	..
	Total	152	..	80	69	3	79	72	1	26	67	31	28

This shows that nails may look normal even though R.B.C. count may be as low as 2 mllions per cmm. and similarly nails may look pale though the R.B.C. count is 4 millions per cmm. So these features alone do not give any definite idea about the severity of anæmia.

(c) *Pigmentation*:—Pigmentation was observed in 49 cases in this group. The distribution was mainly on dorsum of fingers around the nail beds and in a few over the legs. The colour was brownish-black. In 3 cases pigmentation was noted over soft palate, tongue, and buccal mucous membrane. These findings in correlation with R.B.C. range and possible therapeutic deficiency are tabulated as follows:—

TABLE VII

Occurrence of and its Relation wilh R.B.C. and Possible Therapeutic Deficiency.

Pigmentation Cases.	Percentage Incidences.	No. of Cases with R.B.C. Count.		Possible Therapeutic Deficiency.			
		Below 2 mil.	Over 2 mil.	Predominating Iron-deficiency.	P.A. Factor.	Mixed Iron and P.A.	Undetermined.
49	32	31	18	2	30	10	7

This shows that 62% of cases with pigmentation had R.B.C. count less than 2 million per cmm. although to a certain extent pigmentation was present in milder degrees of anæmia as well. 60% of cases with pigmentation were predominantly lacking in the liver principle while 20% of these in both, liver and iron, while only 4% of cases lacked iron predominantly. Thus it appears that in pure iron-deficiency anæmias, pigmentations develop less frequently.

(d) *Edema.*—Swelling of feet and/or face was one of the chief complaints on admission in 39 cases. Edema was not directly related with severity of anæmia (*vide* Table XXIV). The relation of occurence of Edema and concentration of plasma proteins along with R.B.C. counts is shown in table XXIV. In all these cases of edema, renal and cardiac factors were ruled out clinically. Causes of edema were mainly hypoproteinemia and in some cases probably it was a part of avitaminosis. Out of these 39 cases who had edema on feet and/or face, 25 had R.B.C. count below 2·5 mil. per cmm., while 14 had above 2·5 mil. per cmm. Thus edema was present in both the groups.

(e) *Tongue.*—41 patients on admission complained of either sore tongue or had actual glossitis. Besides this other features such as change in colour, presence of fissures, ulcers, and atrophy of papillæ either partial or complete were observed. An effort to correlate these findings with severity of anæmia and possible therapeutic deficiency is made in the table VIII.

TABLE VIII

Incidence of Tongue Appearances on Admission in Relation with Severity of Anæmia and Therapeutic Deficiency.

No.	Change in Tongue Characteristics.	No. of Cases.	Approx. %age.	R.B.C. Range in millions.		Probable Predominant Deficiency.			
				Below 2.5	Above 2.5	Iron	P.A. Factor	Both Iron & P.A.	Undetermined
1	Practically normal	11	7.2	4	7	1	2	1	7
2	Pale but otherwise healthy.	62	42	34	28	14	27	11	10
3	Raw-glossy-sore tongue ..	26	18	22	4	4	12	8	2
4	Glossy and Fissured ..	13	8	9	4	..	6	4	3
5	Raw and Beefy	10	6.6	7	3	..	8	..	2
6	Smooth with partial atrophy of papillæ	23	16	17	6	7	8	5	3
7	Smooth with complete atrophy papilæ ..	7	4.6	6	1	..	4	2	1
	Total ..	152	..	99	53	26	67	31	28

It is seen from this table that about 50% cases had definite changes in tongue appearance on admission such as rawness, soreness, glossy, fissures, glossitis with or without ulcers, partial or complete atrophy of papillæ, etc. Secondly, these changes were more common in those who had a predominating deficiency of P.A. factor.

(f) *Alimentary System.*—Incidence of common symptoms is already given in table III. It is seen there that many patients had some alimentary complaints such as loss of appetite, stomatitis, glossitis, burning in throat, dysphagia, flatulence, jaundice, etc. The percentage incidence is given in table III. The important tongue changes are described in table VIII. Thus symptoms referred to the alimentary tract were present in the large majority of cases. Liver enlargement was detected in 26 cases, splenic enlargement in 23 cases and ascitis was present in 7 cases. The cause of the ascitis in all was severe anæmia with hypoproteinemia.

(g) *Cardio-Vascular System.*—All these cases were very critically examined for any presence of murmurs in the three recognised positions. Hæmic murmur was found in 36 cases. These hæmic murmurs were best heard either at pulmonary area, or at mitral area or in a few cases were equally well heard at both areas. It was also observed that all severe cases of anæmia did not manifest a hæmic murmur and secondly, a hæmic murmur was present even with quite moderate degree of anæmia. The other point observed is that hæmic murmur is often best heard at mitral area only. The following table shows the incidence of hæmic murmurs in relation to severity of anæmia.

TABLE IX

Incidence of Functional Murmurs in Relation with Severity of Anæmia.

Range of R.B.C. Count per cmm.	Hæmic Murmur best heard at Mitral Area.	Hæmic Murmur best heard at Pulmonary Area.	Murmur equally heard at both places	Murmur present in total.	No Murmur present in this group.	Total Cases.
0-1 mil.	6	5	2	13	6	19
1-2 ,, ...	6	6	1	13	48	61
2-3 ,, ...	1	4	2	7	38	45
3-4 ,, ...	3	..	..	3	21	24
4-5 ,, ...	..	..	..	..	3	3
Total	16	15	5	36	116	152

This table shows that out of 80 severe anæmia cases, *i.e.*, R. B.C. below 2 million per cmm. 26 cases only, *i.e.*, 32% exhibited hæmic murmur.

(h) *Central Nervous System.*—History was taken specially for any nervous symptoms. 13 patients complained of burning in feet, 8 complained of heaviness in limbs, 5 complained of pain in calf-muscles, while two complained of paraesthesia. One patient had signs of sub-acute-combined degeneration. This shows that gross neurological disturbances in the group were much less.

(i) Other systems did not show anything in particular. At the end of this clinical examination the probable etiological factors were determined. In some these were multiple. All these cases were classified under three chief groups :—

(1) Dyshæmopœtic,
(2) Hæmorrhagic,
(3) Hæmolytic.

They are tabulated as follows :—

TABLE X

Incidence of Anæmia as per Etiology.

—	Grouped as per Predominant Cause.	Number of Cases in the Group.	Approx. Percentage Incidence.	Remarks.
I	*Dyshæmopoetic*	117	78%	
	Primary defects in—			
	(*a*) Intake	63	42	
	(*b*) Absorption ..	34	22	
	(*c*) Utilisation ..	7	4.6	
	(*d*) Obscure	13	8.6	10 cases in this group were cases of addisonian pernicious anæmia.
	(*e*) Storage	....	....	
	(*f*) Bonemarrow production	....	....	
II	Those with history of chronic hæmorrhage ..	19	12%	
III	*Hæmolytic*	16	10%	
	(*a*) Primary acholuric jaundice	2	1.3	
	(*b*) Malaria	14	9.0%	

It will be seen that 78% cases belonged to dyshæmopœtic group. Defect was either in intake of anti-anæmia factors or in their proper digestion, absorption, etc. In many cases more than one cause was present. Many had defective intake over and above defective absorption, etc. No case of primary aplastic type was met with, out of 13 cases whose etiological factors could not be determined. 10 were addisonian pernicious anæmia. One case appeared to be primary chlorosis, while the remaining two cases were obscure. In 12% cases there was definite history of recurrent repeated bleeding, either from piles or menorrhagia within last three months. In one case there was hook-worm infection. 10% cases were of hæmolytic group, 2 of which (two brothers) turned out to be familial acholuric jaundice.

7. *Hematological Findings :—*

Blood was collected in oxalated bottles and counts were done usually within half an hour of collection. Hæmoglobin estimation was done by Sahlis Hæmoglobinometer and values were taken in grammes per 100 cc. Red blood cells and White blood cells counts were done as per standard method using Nauber's Chamber. Hæmatocrit tubes were spun at 3000 revolutions per minutes for 30 minutes in large standard centrifugaliser as per Wintrobe's method. After 30 minutes revolving hæmatocrit reading was taken and it was revolved for 10 minutes more and when both the readings were constant it was taken as final value for packed cell volume. Erythrocyte Sedimentation Rate was estimated by Wintrobe's method. Various Indices were calculated as formulæ quoted by Whitby in his book. While calculating colour index, 14.5 gms. has been taken equal to 100% hæmoglobin in this work (Whit by Standard). For volume index, 42 cc. for females and 45 cc. for males are taken as normal packed cell volume figures per 100 cc. blood. Reticulocytes count was done by using Cresyl-Blue Stain E. For simple smear examination and sternal marrow slides, Leishman's Stain was used.

(a) *Red Blood Cell Count.—*

TABLE XI

Table showing Incidence of Severity of Anæmia.

No.	R.B.C. Count in millions per cmm.	Number of Cases.	Percentage Incidence.	Remarks.
1	Below 1 million	19	12.6	Severe type.
2	1 to 2 „	61	40.6	
3	2 to 3 „	45	30.0	Moderate.
4	3 to 4 „	24	16.0	
5	4 to 5 „	3	2.0	Mild.

This shows that about 53% cases were of severe type on admission and 46% were of moderate type and only 2% were of mild type. As all the severe types pass mild stage. This type of cases (mild) either do not seek early admission to hospital because of want of symptoms or are not admitted to hospital due to lack of space.

(b) *Haemoglobin.*—For all purposes Hæmoglobin estimated by Sahlis method was considered. Besides this method for comparison hæmoglobin values were estimated from Blood-Iron findings as well as by using copper sulphate specific gravity method. This last method was found unsatisfactory by us. Hæmoglobin values in this series was estimated with Sahlis method.

TABLE XII.

Incidence of Hæmoglobin estimation in the series.

No.	Hæmoglobin in Grams per 100 cc.	Number of cases.	Approx. percentage incidence
1	0- 3 gms.	17	11.3
2	3- 6 ,, ...	42	28.0
3	6- 9 ,, ...	52	34.6
4	9-12 ,, ...	32	21.3
5	12-15 ,, ...	8	5.3
6	Over 15 gms.	1	0.6

(a) *Various Indices* :—M. C. V. figures ranged from 56 C. MU to 156 C. M. U. in this series range, of 80 C. MU to 95 C. MU was taken as normal range and cases in this range were considered as normocytic.

Table showing M. C. V. Values.

TABLE XIV.

No.	M.C.V. in C.MU.	Number of Cases.	Percentage of incidence.	
1	50- 60 C.MU.	1	0.6	Microcytic type 21 cases.
2	61- 70 ,, ...	7	4.6	
3	71- 80 ,, ...	13	8.6	
4	81- 95 ,, ...	33	22.0	Normocytic type 33 cases.
5	96-105 ,, ...	25	16.6	Macrocytic type 98 cases.
6	105-120 ,, ...	35	23.3	
7	120-150 ,, ...	32	21.3	
8	above 150 C.MU. ..	6	4.0	
	Total	152		

This table shows that 22% cases were Normocytic 14% were microcytic and 64% cases were macrocytic type.

(b) *Mean Corpuscular Haemoglobin* (*M. C. H.*) :—Distribution of M. C. H. in this series was as per table XV. A range of 27 micro-micrograms (YY) to 32 YY was taken as normal and cases within this range were grouped under normochromic type.

TABLE XV

Distribution of M. C. H.

No.	Range of M.C.H. in micro-microgam Haemoglobin.	Number of cases.	Approx. Percentage Incidence.	
1	Below 22 yy ..	16	10.6	} Hypochromic 34
2	22-27 yy ..	18	12.0	} cases.
3	27-32 yy ..	33	22.0	Normochromic 33 cases
4	32-37 yy ..	29	19.3	} Hyperchromic 85
5	37-47 yy ..	42	28.0	} cases
6	47-57 yy ..	14	9.3	}
7	Over 57 yy ..	....	....	
	Total	152		

It will be seen here that about 22% cases had M. C. H. within normal range and so were of normochromic type. While about 22% had low M. C. H. value and so were of the hypochromic type, 56% had value of M. C. H. more than normal and so were hyperchromic. In this work M. C. H. is taken as criterion to decide, whether a particular case is Normochromic, Hypochromic or Hyperchromic. This appears to be a more reliable and correct value to decide chromicity of individual R. B. C. as M. C. H. C. which is also taken by some as a guide to chromicity gives the idea of saturation with Iron in general and not of individual R. B. C.

(c) *Mean Corpuscular Haemoglobin Concentration* (*M.C.H.C.*) :—This index is more important in determining the necessity of iron in therapy. Range of M. C. H. C. in this series was as per table XVI.

TABLE XVI

Distribution of M. C. H. C. value

No.	M.C.H.C. Range.	Number of cases	Approximate Percentage Incidence.	
1	Below 20%	2		} Hyposaturation 54
2	20-26%	15	36%	} cases.
3	26-32%	37		}
4	32-38%	95	63%	Normosaturation 95 cases.
5	above 38%	3	....	Hypersaturation.
	Total	152		

Range of 32 to 38% was taken as normal and thus about 64% had normal M. C. H. C. value ; 36% had M. C. H. C. below normal suggesting partial saturation with Iron. In 3 cases M. C. H. C. was more than normal which is theoretically improbable as R. B. C. cannot be over saturated. This cannot be explained at present.

To decide treatment by taking M. C. V. with either M. C. H. or M. C. H. C. alone will not be justified and real idea can only be obtained if all three indices are put together and anæmia is classified accordingly. It is a custom to consider M.C. H. C for chromicity and labelling anæmia hypochromic and hyperchromic etc. but this does not sound correct as M. C. H. C. does not give idea about individual R. B. C. and therefore hyperchromicity with M. C. H. C. can not be estimated. If M. C. H. alone is considered in determining the necessary therapy a mistake is likely to be committed. This happens when M. C. V. increases proportionately than M. C. H. saturation of iron falls below normal though M. C. H. is above normal. The patient will need iron as well, as saturation is below normal. This stresses the importance of all the three indices in the study of every case of anæmia. Accordingly all the cases are grouped under the following types, which are practical possibilities. M. C. V. is taken for cytosis, M. C. H. is taken for chromicity while M. C. H. C. is taken for saturation. By doing permutations and combinations (excluding polycythæmic and normocythæmic groups) one can describe about 27 types of anæmia but out of these, only the following eight types are commonly met with in practice.

TABLE XVII

Incidence of anæmia according to Hœmatological classification in relation with etiological factors and the type of therapy they need.

All cases had R. B. C· counts below 5 millions (Hypocythæmic)

No.	Type of Anæmia.	Total Cases.	% age incidence.	Etiological Grouping.			Indication of therapy they need.
				Dys-haemo-poetic.	Hæmo-rrhagic.	Hæmo-lytic.	
1	Normocytic Normochromic Normosaturation type.	24	16.0	18	4	2	Liver or Iron not indicated.
2	Normocytic Hypochromic. Hyposaturation type.	9	6.0	9	..	..	Iron.
3	Microcytic Hypochromic. Normosaturation type.	4	2.6	..	2	2	Iron.
4	Microcytic Hypochromic. Hyposaturation type.	17	11.3	9	5	3	Iron.
5	Macrocytic Hyperchromic. Normosaturation type.	67	44.6	57	4	6	Liver.
6	Macrocytic Hyperchromic. Hyposaturation type.	18	12.0	13	3	2	Liver with Iron.
7	Macrocytic Normochromic. Hyposaturation type.	9	6.0	7	1	1	Liver with Iron.
8	Macrocytic Hypochromic. Hyposaturation type.	4	2.6	4	..	..	Liver with Iron.
	Total	152	..	117	19	16	

It will be seen from this table that all the three indices are essential in classifying anæmias. For example if M. C. H. C. is taken for chromicity in place of M. C. H., then microcytic hypochromic normo-saturation type of table XVII will be called microcytic normochromic type, which however cannot be as smaller sized R. B. C. cannot contain normal amount of hæmoglobin unless it gets over saturated. Over saturation of R. B. C. with hæmoglobin is not possible.

In Group I, we had 24 cases where except low R. B. C. count and hæmoglobin value, all other indices were within normal range. In 15 out of these, bone marrow showed either normoplastic or hypoplastic normoblastic reaction. None was of the aplastic type. In this group 18 were dyshæmopoietic, 4 were hæmorrhagic and 2 were hæmolytic. Bone marrow hypoplasia might be responsible for such a picture and it was not clear from this what therapy they needed. Rest of the groups are obvious and need no explanation.

(d) *Other Indices.*—Volume Index (V. I.) Colour Index (C. I.) and Saturation Index (S. I.).

These indices correspond to M. C. V.—M. C. H. and M. C. H. C. respectively, but are less reliable as they are not absolute indices and secondly they depend on some standard taken as normal. As "Normal Standards" vary with nations and races, the value of these indices also thus will vary to some extent. The findings are tabulated in table no. XVIII.

TABLE XVIII

Distribution of cases according to indices.

Respective value of indices.	For Size Index.		For Hæmoglobin value per R.B.C.		For Saturation as a whole.	
	Volume Index.	M.C.V.	Colour Index.	M.C.H.	Saturation index.	M.C.H.C.
Value below average normal	16	21	23	34	41	54
Values as normal ..	54	33	34	33	101	95
Value above average normal	82	98	95	85	10	3

Normal range for these indices is taken between 0.9 to 1.1. The findings of these values are compared with the corresponding values obtained by M. C. V.-M. C. H. and M. C. H. C. respectively. Difference in the result is obvious. This suggests that one should not rely more on Volume Index, Colour Index and Saturation Index. Absolute indices are superior to the former ones.

White Blood Cells Count :—

TABLE XIX

Distribution of W.B.C. Count in Relation to R.B.C. Count.

R.B.C. Count Range in mil. per cmm.	Distribution of White Blood Cells Count in the Groups. *In Thousand.*							Total Cases.
	upto 2	2-4	4-6	6-8	8-10	10-15	15-25	
Upto 1 Mil.	3	11	3	1	1	..	..	19
1 to 2 Mil. ..	2	16	21	15	4	3	..	61
2 to 3 Mil. ..	..	2	23	14	4	2	..	45
3 to 4 Mil. ..	..	3	7	8	4	1	1	24
4 to 5 Mil. ..	..	..	1	1	..	..	1	3
Total ..	5	32	55	39	13	6	2	152

It is seen from this table that severity of anæmia did not always affect the W.B.C. count.

Blood-Smear Examination and Differential W.B.C. Count.—Poikiolocytosis and anisocytosis were detected in microcytic as well severe forms of microcytic enæmias. It was observed that with anæmia, absolute count of polymorphs was below normal in about 40% cases, while there was increase in eosinophilic count in about 15% cases. No other inference could be drawn.

Reticulocyte Count.—It was done in all on admission. In 125 cases it was below 2% on admission, while in 27 cases, who were having some therapy on admission, it was between 2 to 5%.

Packed Cell Volume.—Packed cell volume was estimated as per Wintrobe's method. Findings are as follows :—

TABLE XX

Distribution of Packed Cell Volume on Admission.

Packed Cell Volume in ccs. per 100cc.	Number of Cases.	Percentage.
Upto 10 cc	20	13%
11-20 cc	48	32%
21-30 cc	63	42%
31-40 cc	21	14%
41-50 cc	..	..

Minimum was 6 cc per 100 cc blood.

Other Investigations :—

(a) *Erythrocyte Sedimentation Rate* (*E.S.R.*).—This was done as per Wintrobe's method and final correction was done for packed cell volume. E.S.R. was performed soon after collection of blood. Uncorrected value ranged from 4 mm to 91 mm at the end of one hour but after correcting for anæmia it ranged from 0 to 30.

TABLE XXI

Distribution of Corrected and Uncorrected E.S.R. Value in Relation to Packed Cell Volume and Red Blood Cells Count.

No.	Packed Cell Volume	No. Cases.	R.B.C. Count		Range of E.S.R. in mm at the End of First Hour.									
			Below 2.5 mil.	Above 2.5 mil.	0-5	6-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
1	Upto 10cc.	13	13	..	a ..	..	..	..	2	..	1	1	1	7	1
					b 10	3	..	..	..	..	..	..	..	..	..
2	11-15	21	20	1	a 1	..	1	2	..	3	4	1	4	5	..
					b 12	7	2	..	..	..	..	..	..	..	..
3	16-20	15	14	1	a ..	..	2	2	2	3	2	2	2	..	..
					b 9	3	3	..	..	..	..	..	..	..	..
4	21-25	27	22	5	a ..	..	..	5	4	3	8	2	4	1	..
					b 8	7	6	6	..	..	..	..	..	..	..
5	26-30	20	9	11	a ..	..	2	3	3	5	4	3	..	..	..
					b 4	4	9	3	..	..	..	..	..	..	..
6	31-35	9	..	9	a 1	..	2	1	1	3	1	..	..	..	..
					b 3	..	3	2	..	..	..	..	..	..	..
7	36-40	5	..	5	a 1	1	1	1	..	1	..	..	..	..	..
					b 1	2	1	..	1	..	..	..	..	..	..
8	41-50	1	..	1	a ..	1	..	..	..	..	..	..	..	..	..
					b ..	1	..	..	..	..	..	..	..	..	..
	Total ..	111	78	33	a 3	2	8	14	12	18	20	9	11	13	1
					b 47	28	24	11	1	..	..	..	..	..	..

a : Uncorrected value of E.S.R. in mm.
b : Values after correction for P.C.V.

This table shows that in about 70% cases of anæmia of all types, E.S.R. was normal after correction for packed cell volume. In 22% cases it was increased slightly while in about 8% only it was moderately increased. Thus E.S.R. is not raised in anæmia. Uncorrected value ranged upto 90 mm and so are likely to be deceptive.

Vanden Berg Reaction.—It was done in 138 case.

TABLE XXII(A)

No.	Vanden Berg Reaction.	Number of Cases.	Percentage Incidence.
1	Immediate Direct Positive	1	0.3
2	Delayed Direct Positive	13	8.6
3	Indirect Positive	86	56.0
4	Negative	38	26.0
5	Not done	14	9.0

Icterus Index.—It was estimated in 138 cases.

TABLE XXII(B)

No.	Range of Icterus Index.	Number of Cases.	Per Cent Approx.
1	Upto 5 Units.	55	36
2	5 to 10 „	65	44
3	11 to 15 „	12	8
4	15 to 20 „	4	3
5	21 to 25 „	1	0.6
6	Not done	15	10

It is seen from these tables that both Vanden Berg Reaction and Icterus Index were abnormal in about 60% cases. Icterus Index was above normal in about 64% cases.

Kahn Test.—This test was performed soon after admission. It was positive in 4% cases only.

Urine Examination.—Urine was quite normal in 122 cases. 12 cases showed presence of Albumin alone, 10 cases had pus cells alone, while 8 had both albumin and pus cells. In none there was any evidence of severe urinary infection.

Stools Examination.—This revealed no abnormality in 120 cases, *i.e.*, 80% cases. Infection with Ankylostoma Duodenalis was detected in 1.3% only, showing that incidence of this infection is too low in this class of people. Repeated examination was not done for Entoemoeba histolytica. 18% cases had either ova of round-worm or whip-worm, vegetative or cystic forms of E.nana and Giardia lamblia. About 3% cases showed excessive fatty stools. Incidence of Sprue type syndrome in this series was thus very low.

Gastric Analysis.—This was done in 108 cases. Meal used for this was gruel meal. Of 40 cases of complete achlorhydria, Gastric Analysis after histamine injection could be done only in 16 cases, out of which 6 turned out to be histamine

fast achlorhydria. One case in this group belonged to microcytic type. Findings are as follows :—

(1) Complete Achlorhydria was met with in 40 cases—*i.e.*, 26% of the series.

(2) Hypochlorhydria was found in 32 cases, *i.e.*, 22% of the total.

(3) Normal range curve was found in 25 cases, *i.e.*, 16% cases.

(4) Hyperchlorhydria was detected in 11 cases, *i.e.*, 8% cases.

(5) Gastric analysis could not be done due to various reasons in 44 cases, *i.e.*, 30% cases.

Those who had free acid upto 0.08% were grouped in hypochlorhydria, from 0.08 to 0.18 as Normal, and above, 0.18 as hyperchlorhydria. Out of 40 cases who had achlorhydria, 12 cases were of microcytic type, while rest were macrocytic type. One in microcytic group had histamine fast achlorhydria. Thus majority of cases showed some variation from normal on gastric analysis.

Sternal Puncture Findings and their Correlation with Corresponding Peripheral Blood Picture.—Sternal puncture was done in 135 cases in this series. About $\frac{1}{2}$ cc. blood was aspirated from Sternal marrow. Total nucleated cell count and smear examination was done. 500 nucleated cells were counted on an average. Nomenclature adopted was as shown in "Whitby's Disorders of Blood (1946)." All sternal punctures and study of myelogram were handled by Dr. Jhatakia throughout the work to preserve uniformity. All the cases in the series grouped as follows according to sternal myelogram :—

(I) *Normoblastic Type.*—Cases which did not show any megaloblast in myelogram were included in this group. This was subdivided as follows :—

(a) *Normoplastic Normoblastic.*—When normoblastic were 10 to 25% of total nucleated cells.

(b) *Hypoplastic Normoblastic.*—Normoblasts range from 4 to 10% of total nucleated cells.

(c) *Hyperplastic Normoblastic.*—Normoblasts were more than 25% in differential nucleated cell count.

(d) *Aplastic Type.*—Bone marrow showing hardly upto 3 to 4% normoblasts along with other features.

(e) *Hyperplastic Macronormoblastic.*—When there are more than 25% normoblasts, and these normoblasts are bigger in size than usual.

(II) *Megaloblastic.*—Cases which showed presence of megaloblasts in myelogram. This group is subdivided according to percentage of myeloblasts. This is an arbitrary division for clearer out-look.

(a) *Mild Megaloblastic.*—Megaloblasts percentage upto 4% of total nucleated cells.

(b) *Moderate Megaloblastic.*—Megaloblasts ranging from 4 to 20%.

(c) *Predominantly Megaloblastic.*—Megaloblasts above 20% of total nucleated cells.

Table XXIII gives the distribution of cases as per sternal myelogram findings.

TABLE XXIII

Distribution of cases according to myelogram and correlation of these with type etiology and therapy in these cases.

	Type of Bone-marrow reaction.	Total No. of Cases.	%age Incidence.	Macrocytic Picture in periphery.					Normocytic Type.				Microcytic Type.			
				Clinical type.		Saturation.		Cases which had some therapy before.	Clinical type		Saturation.		Clinical type.		Saturation.	
				Dh.	H-ragic & Hamolytic	Normal N	Hypo. Hy.		Dh.	H.-gic & H. tic.	N.	Hypo.	Dh.	H. gic & H. tic.	N.	Hypo.
1	Normoplastic Normoblastic ..	35	24	17	2	14	5	14	9	..	8	1	2	5	2	5
2	Hypoplastic Normoblastic ..	25	16	15	3	13	5	14	6	..	3	3	..	1	..	1
3	Hyperplastic Normoblastic and Macro. N. blastic.	25	16	6	7	8	5	9	..	4	2	2	4	4	1	7
4	Mild. Mg. blastic.	29	20	19	1	12	8	10	5	1	3	3	3	..	1	2
5	Mod. Mg.blastic .	21	14	17	1	15	3	9	3	..	3	..	..	..	..	..
6	Sternal Puncture was not done in..	17	12	7	3	8	2	6	4	1	5	..	..	2	..	2
7	Total	152		81	17	70	28	62	27	6	24	9	9	12	4	17
	Total				98					33					21	
	Percentage ..				66%					22%					14%	

It will be seen from this table that 50 cases of macrocytic anaemia had either normoplastic or hypoplastic normoblastic bone marrow. 37 of these had some sort of treatment before admission which might have affected bone marrow picture. 15 cases in this group had hyposaturation. 12 cases were either haemorrhagic or haemolytic type. Thus there were yet 13 cases of macrocytic type who had no therapy previously and sternal marrow of which showed normoblastic reaction of normal type (Macronormoblastic type was not present here). This is a deviation from what one thinks it should be as usually patient with macrocytic peripheral picture in absence of any previous therapy shows megaloblastic myelogram or in some instances macronormoblastic myelogram. This point is important for treatment aspect. Is it possible that such tropical macrocytic anaemia with normoblastic bone marrow can exist as separate entity ?

It will be seen from this table that out of 66% macrocytic cases, 34% cases only needed Liver as therapy in contrast to 66% cases from peripheral blood picture. Thus there is wide difference in between the two. For convenience, macro-

cytosis alone is taken criterion for "Liver Therapy" as far as peripheral picture is concerned.

Whole-Blood Iron.—Blood Iron estimation was done in 132 cases. Range was from 10 to 55 Milligram per 100 cc. Wong's method was used for estimation. Haemoglobin values were also derived from Blood Iron findings and were compared to the values obtained by Sahli's method in same case. Both were done on same day and from same sample of blood. These values for comparison are shown in Appendix A.

The distribution of blood iron values were as follows :—

TABLE XXIV

Blood Iron Values

Milligrams/100cc	Number of Cases	Percentage of Series.
Upto 10	2	1.3
11-20	42	28.0
21-30	47	32.0
31-40	31	20.0
41-50	9	6.0
51-55	1	0.6
Not done	..	13.3

Hæmoglobin Values derived by various methods are compared in Appendix A. Hæmoglobin values derived by CuSo4 method are variable and unreliable. Those from blood-iron estimations are constantly higher than those by usual Sahli's method.

Plasma Proteins.—Plasma proteins estimations were carried out in 131 cases. Method used for this was Kjeldahl micro method with nesselerisation. Simultaneously these estimations were also done by Copper sulphate specific gravity method. Results with later method in anæmia cases were not quite satisfactory. The findings by both the methods in few cases are given in Appendix B for comparison. In following tables and wherever there is reference of plasma proteins, values obtained by Micro-Kjeldahl method are only considered. Relation between red blood cells count, occurrence of edema, and plasma protein values is shown in table No. II. Corresponding values of Albumin and Globulin in each groups are also shown.

Edema was present in 39 patients in this series. In two cases plasma-proteins estimation was not done. It was observed from the findings that occurrence of edema is not related with severity of anæmia as edema was present in moderate as well as severe cases of anæmia. Out of 99 cases with R.B.C. count below 2.5

millions per cmm. Edema was present in 25 cases, *i.e.*, 25%, while out of 53 cases with R.B.C. count above 2.5 millions per cmm, edema was present in 14 cases, *i.e.*, 26%. Thus it is nearly equal in both groups.

TABLE XXV

Incidence and Relation of Total Plasma-Protein, Albumin and Globulin Values with Edema and Anæmia.

No.	Total plasma protein in group.	No. of Cases.	Cases with edema.	Cases with no edema.	Range in gms. %	Cases for Globulin range.	Cases for Albumin range.	Edema present in Corr. group.	R.B.C. Count in Respective groups in relation to Alb.			
									R.B.C. below 2.5 mil.	Edema present.	R.B.C. above 2.5 mil.	Edema present
1	0-3	2	2	..	0-2	2	2	2	..	..	2	2
					2-3	..	..	..	..	..	..	..
2	3-5	29	18	11	0-2	11	10	8	5	3	5	5
					2-4	18	19	10	17	8	2	2
					4-5	..	..	..	..	..	..	..
3	5-7	80	14	66	0-2	8	5	4	4	3	1	1
					2-4	66	72	10	53	7	19	3
					4-7	6	3	..	1	..	2	..
4	7-9	17	2	15	0-2	..	..	..	..	..	..	..
					2-4	9	16	2	14	2	2	..
					4-7	8	1	..	..	..	1	..
					7-9	..	..	..	..	..	..	..
5	9-11	3	1	2	0-2	..	..	..	..	..	..	..
					2-4	..	1	1	1	1	..	..
					4-7	2	2	..	2	..	..	..
					7-9	1	..	..	..	..	..	..
					9-11	..	..	..	..	..	..	..
	Total ..	131	37	94	..	..	..	..	97	24	34	13

It is seen from this table that occurrence of edema was related to plasma proteins to some extent but not in all cases. Out of 29 cases who had total plasma proteins below 5 gms. % edema was present in 18 cases only, *i.e.*, 60%, while in 40% inspite of low protein values, there was no clinical edema.

Looking at various groups in table XXV, it is seen in group I that albumin was below 2 gms in two cases and edema was present in both. In group II albumin was below 2 gms. in 10 cases but clinical edema was present in 8 cases. In same group albumin was 2 to 4 gms.% in 19 cases and edema was present in 10 cases. Thus out of 29 cases with albumin below 4 gms. clinical edema was present in 18 cases. Of all cases where albumin was less than 2 gms. per 100 cc, clinical edema was seen in 14 cases. It was observed that all 37 cases who had edema, showed albumin values below 4 gms. per 100 cc, but all the cases with albumin value below 4 gms. did not show clinical edema.

All cases with hypoproteinimia did not show clinical edema. Edema was absent in 35% cases of hypoproteinimia (Total proteins below 5 gms.%) This suggests that edema formation is not related only to blood protein levels but to some factors also as far as edema in anaemia is concerned.

Globulin values are also shown in table. They are not so much concerned in edema formation. It is observed from table, that where total proteins values were high, globulin level rises more than albumin.

Estimation of plasma proteins were done with Micro-Kjeldahl and Nesslerisation method.

TABLE XXVI

Appendix A.—Haemoglobin values in groups per 100 cc derived by various methods.

Case No.	Sahli's method in gms.	Derived from blood-iron estimation in gms.	From Copper Sulphate Sp. Gr. method in gms.	Case No.	Sahli's method in gms.	Derived from blood-iron estimation in gms.	From Copper Sulphate Sp. Gr. method in gms.
1	1.7	2.99	..	26	7.82	8.5	8.8
2	2.72	3.58	..	27	8.1	9.25	8.0
3	1.87	3.00	..	28	8.52	10.74	9.0
4	2.38	3.73	..	29	8.67	10.0	8.0
5	2.55	4.48	4.5	30	8.84	8.36	9.2
6	3.06	3.58	9.2	31	8.5	8.36	6.4
7	3.40	4.48	4.0	32	8.6	7.76	9.0
8	3.57	5.37	4.0	33	8.67	10.0	8.0
9	3.74	4.77	..	34	8.5	10.74	9.0
10	4.08	5.37	..	35	8.16	8.65	10.2
11	4.08	3.88	..	36	9.18	12.2	9.6
12	4.76	6.56	..	37	9.18	7.46	8.8
13	4.25	4.77	8.4	38	9.52	6.86	8.3
14	4.59	5.82	..	39	9.5	10.4	9.4
15	4.93	5.3	6.9	40	9.86	9.55	8.6
16	5.2	4.48	7.8	41	10.2	10.44	9.0
17	5.27	8.0	9.0	42	10.2	9.25	9.2
18	5.10	6.70	..	43	10.3	10.89	9.6
19	5.44	5.52	..	44	11.05	16.42	..
20	6.12	6.72	9.4	45	11.22	11.34	9.5
21	6.46	5.96	7.4	46	11.22	11.94	9.6
22	6.8	7.91	7.4	47	12.92	10.45	11.8
23	7.48	8.06	7.5	48	13.26	7.46	8.8
24	7.48	6.86	9.2	49	12.24	11.64	11.83
25	7.65	9.55	8.2	50	16.6	13.73	..

Appendix B.— In this following table comparison is made of plasma proteins value derived by Kjeldahl method and copper sulphate gravity method. The values of total proteins, Albumin and Globulin in CuSo4 specific gravity method were obtained as follows :—

Total Proteins in gms. = 343 (Sp. Gr. of plasma—1.00)

For Albumin Value in anaemia cases :—

Albumin = (Total proteins—2) × 0.9

APPENDIX B.

TABLE XXVII

Blood protein values derived by Kjeldahl method and copper sulphate gravity method in cases of anæmia.

No.	R.B.C. in million per cmm.	Hæmoglobin in gms. %	Micro-Kjeldahl method			Copper Sulphate Sp. Gr. method.			Difference in total Protein value by CuSo4 method
			Total protein	Albumin	Globulin	Total protein	Albumin	Globulin	
1	0.62	2.55	6.25	5.2	1.05	5.8	3.42	2.38	– 0.45
2	0.72	3.4	5.27	3.26	2.01	5.14	2.85	2.29	– 0.13
3	1.06	3.74	4.93	1.71	3.22	5.15	2.83	2.32	– 0.22
4	0.96	3.06	6.84	2.76	4.08	5.15	2.84	2.31	– 1.69
5	1.06	3.74	4.93	1.71	3.22	5.15	2.83	2.32	– 0.22
6	1.16	4.42	6.38	2.55	3.83	4.6	2.34	2.26	– 1.78
7	1.35	6.8	5.9	3.23	2.67	3.75	1.57	1.18	– 2.15
8	1.6	5.27	7.50	3.96	3.54	5.8	3.42	2.38	– 1.70
9	1.5	2.25	6.0	2.85	3.15	5.14	2.85	2.31	– 0.86
10	1.61	6.46	8.52	3.57	4.95	5.83	3.15	2.68	– 2.69
11	1.68	7.65	6.69	3.28	3.41	6.5	4.05	2.45	– 0.19
12	1.72	6.46	6.05	3.76	2.29	4.8	2.52	2.26	– 1.25
13	1.91	8.84	5.58	2.85	2.73	5.15	2.83	2.32	– 0.43
14	1.84	3.4	6.46	3.57	2.87	5.8	3.42	2.38	– .066
15	1.93	6.12	4.81	2.4	2.41	4.75	2.48	2.27	– 0.06
16	2.03	8.1	5.36	2.38	2.98	5.14	2.85	2.29	– 0.12
17	2.04	8.67	5.23	3.08	2.15	7.2	4.62	2.52	– 0.61
18	2.13	8.84	4.26	2.44	1.82	5.15	2.83	2.32	– 0.89
19	2.32	3.4	7.56	3.07	4.49	8.57	5.91	2.66	– 1.01
20	2.36	7.82	7.05	3.17	3.88	7.16	4.64	2.52	– 0.11
21	2.64	8.67	7.81	2.48	5.33	7.86	5.27	2.59	– 0.05
22	2.8	7.14	3.63	1.52	2.11	3.77	1.59	2.18	– 0.14
23	2.97	10.2	4.36	1.65	2.71	5.15	2.83	2.32	– 0.79
24	3.2	9.18	5.71	2.43	3.28	5.14	2.85	2.29	– 0.57
25	3.36	12.92	6.33	3.17	3.16	3.1	0.99	2.11	– 3.23
26	3.1	9.18	5.45	2.32	3.13	5.15	2.84	2.31	– 0.30
27	3.8	13.26	7.35	3.46	3.89	7.15	4.64	2.51	– 0.20
28	3.91	6.8	6.25	2.64	3.61	5.83	3.15	2.68	– 0.42
29	4.2	10.2	6.62	3.18	3.44	6.5	4.05	2.45	– 3.18
30	3.48	9.86	5.95	3.17	2.78	6.50	4.05	2.45	– 0.55

SUMMARY AND CONCLUSION

1. This work was undertaken to study the (*a*) Common factors responsible in causing anæmia ; (*b*) Types of anæmias, (*c*) Various biochemical and hematological finding.

This work has been done, keeping in view the previous surveys carried out under the auspices of the Gujarat Research Society on health and nutrition.

2. The important data gathered from this work show that the chief cause of anæmia in our people is " defective nutrition." This confirms the previous work which has brought out that nutrition in our middle class Gujarati families is poor and inadequate. Almost 75% patients in this series had poor nutrition and 50% of patients had anæmia because of poor nutrition alone while the rest had some extra factors also.

152 cases in all were studied in details as per our plan and other conclusion are as follows :—

3. All the patients came from the lower middle-class, with a family income not exceeding Rs. 150 p.m.

4. Chief complaints are tabulated. Majority had either general weakness, loss of weight, loss of appetite and/or fatigue. There were patients who had a few symptoms, inspite of a very severe degree of anæmia.

5. Majority of patients belonged to nutritional deficiency anæmia.

6. Skin and Nails were sometimes normal, in presence of marked anæmia.

7. Edema of feet and face etc. was not directly related with severity of anæmia.

8. Tongue changes were more marked in non-iron deficiency anæmia.

9. Hæmic murmur was not present with many cases of severe anæmia.

10. Central nervous system symptoms were noted in 29 cases only.

11. 78% cases were of dyshaemopoietic type, 12.0% were of hæmorrhagic type and 10.0% were of hæmolytic type.

12. About 53% were of severe grade, 46% were of moderate grade while 2% were of mild grade in this series. This is so because mild grade cases rarely get admitted in the hospital.

13. From M.C.V. it was found that 25% were normocytic, 14% were microcytic while 64% were macrotcytic type.

14. From M.C.H. it was found that 22% were normochromic, 22% were hypochromic, while 56% were hyperchromic.

15. From M.C.H.C. it was observed that 36% had hypo-saturation, and 64% had normal-saturation with iron.

16. From the study of various indices, it is observed that in deciding therapy all the three indices *i.e.*, Mean Corpuscular Volume, Mean Corpuscular Hæmoglobin and Mean Corpuscular Hæmoglobin Concentration should be considered.

17. Considering all indices, the cases were grouped under eight types *i.e.*, Macrocytic hyperchromic normo-saturation type etc., 44% cases belonged to macrocytic hyperchromic normal saturation type.

18. Volume Index, Colour Index and Saturation Index are less reliable than M.C.V., M.C.H., and M.C.H.C.

19. Total white blood cells count was not directly related to the severity of anæmia.

20. Erythrocytic Sedimentation Rate in majority of anæmia cases was within normal zone, after correcting for packed cell volume values.

Uncorrected E.S.R. values are very high and so misleading.

21. In about 56% cases, Vanden Berg reaction was indirect positive and Icterus Index more than 5 units.

22. Kahn Test was positive only in 4% of cases in this series.

23. Stools examination revealed 1.3% incidence of ankylostomiasis in this series.

24. Gastric Analysis:—36% had achlorhydria, 30% had hypochlorhydria, 23% had normal curve, while 10% had hyperchlorhydria. Histamine fast achlorhydria was observed even in microcytic type of anæmia.

25. Sternal puncture findings were correlated with peripheral blood picture. Some macrotytic anæmia cases, without having taken any treatment, showed complete normoblastic bone marrow (Macronormoblastosis was carefully excluded in those cases). This is thus difficult to explain. All these cases belonged to Dyshœmopietic group. 34% cases showed megaloblastic arrest in contrast to 66% macrocytic anæmia. This stresses that all macrocytic anæmia do not show megaloblastic or even macronormoblastic bone marrow and thus all of them may not require liver therapy.

26. Correlation of edema formation and protein values is done. It is observed that all cases of edema in anæmia did not show hypoproteinimia. Similarly, all cases of hypoproteinimia (*i.e.* Total proteins less than 5 gms.) did not show edema formation. Thus some other factors are also concerned in edema formation.

27. Severity of anæmia had no relation with plasma protein values and *vice versa*.

28. All cases with edema had their albumin value below 4 gms. per cent. but all cases with albumin less than 4 gms. per cent. did not exhibit edema.

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SYNTHETIC FOLIC ACID IN MACROCYTIC ANÆMIA

By

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While the research work on anæmias was being done, the synthetic folic acid became available for clinical trial. It was therefore decided to use it in cases showing a peripheral macrocytic blood picture. Twenty-one patients were selected for this trial. Criterion for selection was macrocytic anæmia with Mean corpuscular volume more than 100 cubic micron. Bone marrow picture was not taken as a guide in this selection. A uniform oral dose of 20 mgm. of Folic Acid (Folvite—Lederli co.) was given daily as 10 mgm. twice a day for 30 days in each case. Patients were given usual hospital diet consisting of wheat chapaties, vegetables, rice, dal, and some milk. No other drug was given to the patient during the course with Folic Acid. Reticulocyte count was done every other day and routine blood count was done every 4th day for first ten days and then once a week till discharged. Sternal puncture was repeated wherever possible after two weeks of treatment with Folic Acid.

Out of 21 cases selected for Folic Acid trial 17 were males and 4 were females. Distribution of age was 10 to 20 years in 3, 21 to 30 in 11, and 31 to 40 in 7 cases. All patients belonged to poor middle class and their monthly income ranged from Rs. 50 to 150. Diet in these patients was vegetarian including milk. On inquiry it was found that the diet of only two patients was adequate. Besides the poor diet one patient had repeated attacks of malaria, in one female patient there was history of profuse menorrhagia, in one male there was history of bleeding piles, seven patients gave history of chronic diarrhœa while in rest there was no apparent factor present.

Six patients in this series had history of anæmia before. A detailed inquiry was made about the previous treatment they had within last 2 months prior to admission. This was specially done to correlate peripheral blood picture findings with sternal myelogram. Ten patients had no treatment at all, five had some oral therapy while 6 patients had few liver injections with or without vitamin B complex.

Chief complaints on admission in this group were general weakness, poor appetite, diarrhœa, stomatitis, glossitis, and loss of weight. Chief findings on admission were palour of skin and nails, pigmentation around nail beds, edema on feet, acute glossitis and hemic murmur.

Hematological Findings on Admission.—In all these cases blood was examined for R.B.C. and W.B.C. count and hæmoglobin estimation (Sahli's method). Packed cell volume was done after centrifugalising for 30 minutes at 3,000 r.p.m. (Wintrobe). Differential leucocytic count and study of peripheral smear were done. Indices were derived as per standard methods.

Red Blood Cells Count.—18 cases had R.B.C. count less than 2 mill. per cmm. on admission, while 3 cases had between 2 and 3 mill. R.B.C. per cmm. Lowest count was 0.48 mill. per cmm.

Hæmoglobin Values.—Ranged from 2.72 gms. per 100 cc. to 11.56 gms. per 100 cc. blood. In 18 cases it was below 9 gms. per 100 cc. blood.

Total W.B.C. Count.—It ranged from 2,850 to 10,900 per cmm. In 14 cases it was below 6,000 per cmm.

Packed Cell Volume.—Ranged from 8 cc. to 33 cc. per 100 cc. blood. In 14 cases it was below 20 cc.

Mean Corpuscular Volume (*M.C.V.*).—In all these cases M.C.V. was above 100 cM. It ranged from 101 to 156 cM.

Mean Corpuscular Hæmoglobin (*M.C.H.*).—This ranged between 33yy and 56yy. Thus all cases had M.C.H. above normal on admission.

Mean Corpuscular Hæmoglobin Concentration (*M.C.H.C.*).—This ranged from 30% to 38%. In 4 it was below normal range, in 17 it was within normal range. Thus 4 cases on admission had hyposaturation.

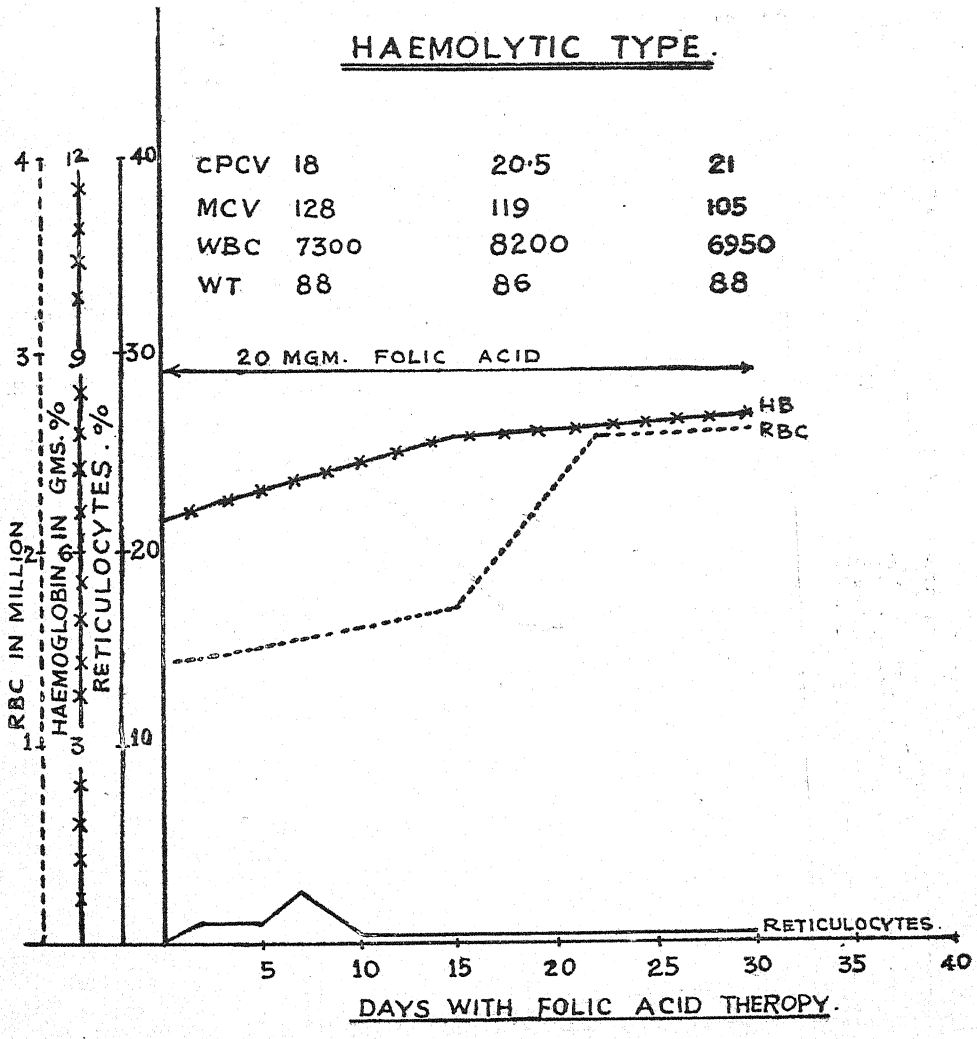
Reticulocyte Percentage.—In 10 previously untreated cases was 0%.

Sternal Myelograms on Admission.—Sternal puncture was done in all these cases on admission. Total nucleated cell count per cmm. was done in 19 cases while differential nucleated cell count was performed in all. 500 cells were usually counted. Technique and nomenclature which we adopted is according to Whitby's "Disorders of Blood" (1946). All the patients had macrocytosis in peripheral blood picture and differentiation from megalocytosis is not done in this series. Bone marrow findings were grouped as—

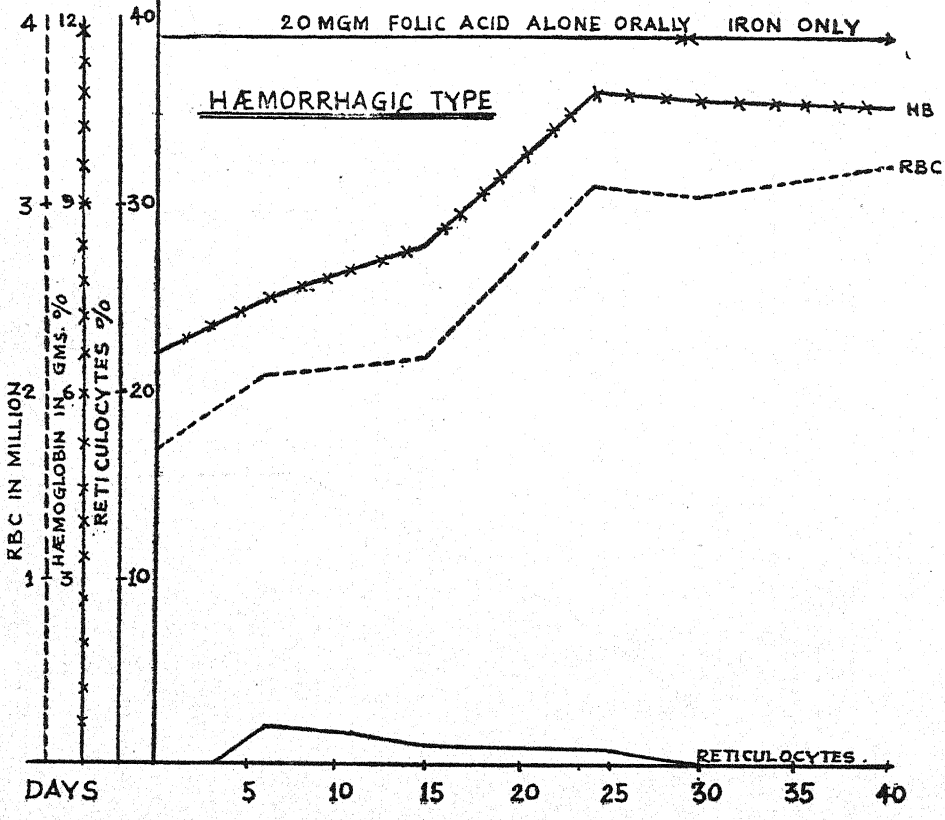
(1) Moderately megaloblastic :—Where megaloblasts were more than 4% and less than 20% in differential nucleated cell count.

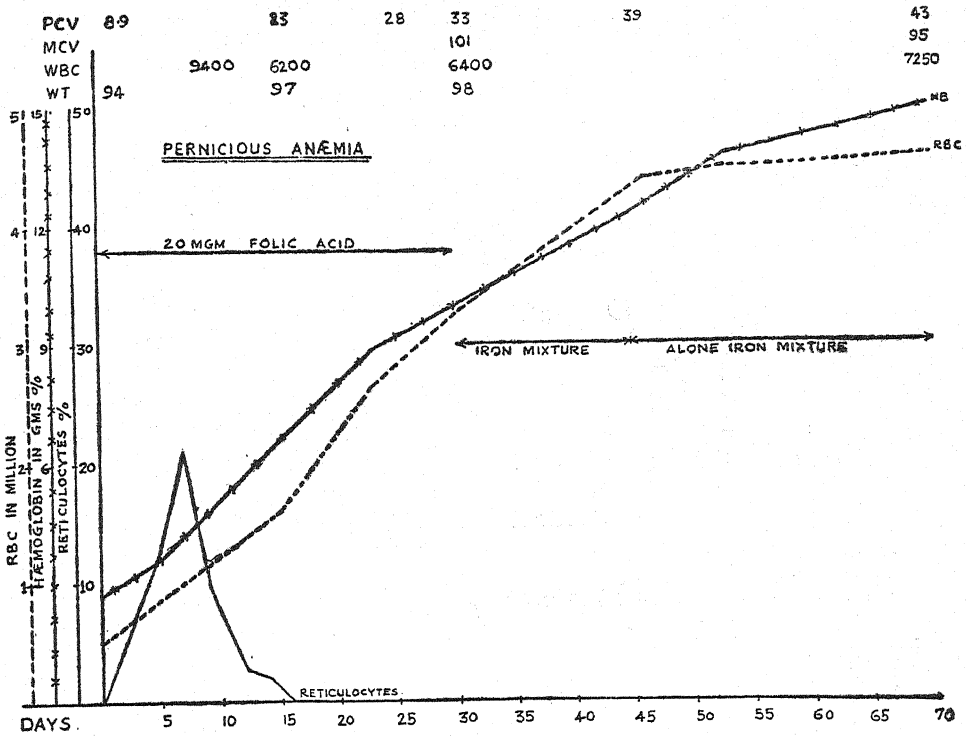
(2) Mild megaloblastic :—Where megaloblasts were upto 4% in differential count.

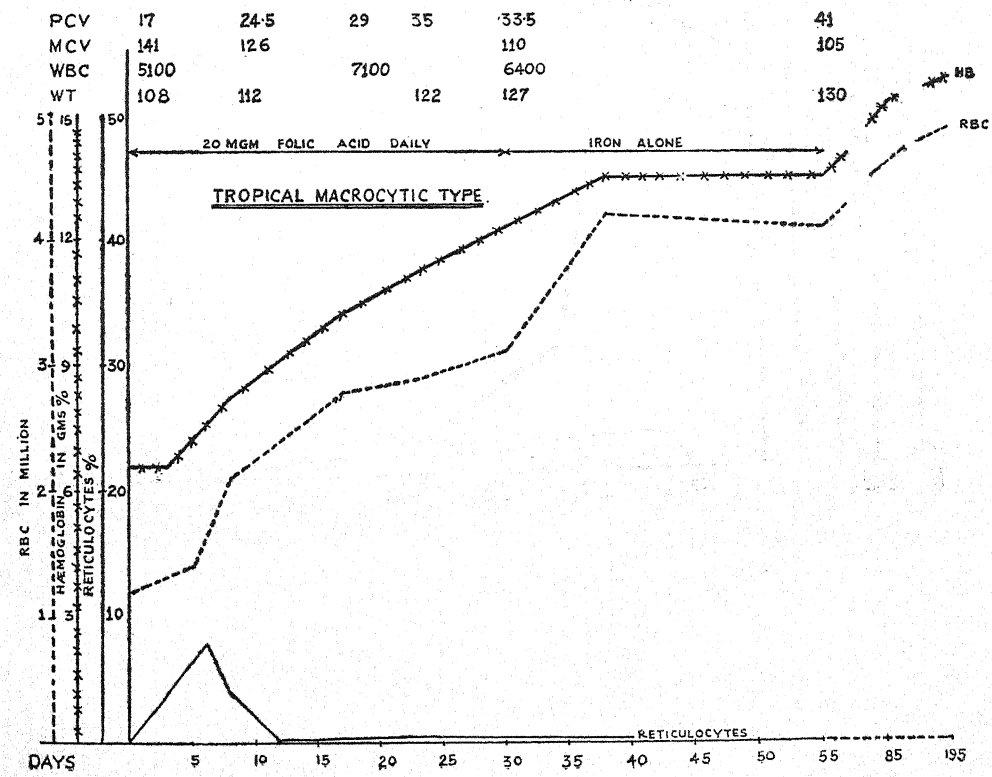
(3) Normoblastic :—Including Hyperplastic macronormoblastic, normal normoblastic and hypoplastic normoblastic. In this group not a single megaloblast was found in sternal smear.


HAEMOLYTIC TYPE.
CPCV 18 20·5 21
MCV 128 119 105
WBC 7300 8200 6950
WT 88 86 88
20 MGM. FOLIC ACID
HB
RBC
RETICULOCYTES
RBC IN MILLION
HAEMOGLOBIN IN GMS. %
RETICULOCYTES. %
DAYS WITH FOLIC ACID THEROPY.

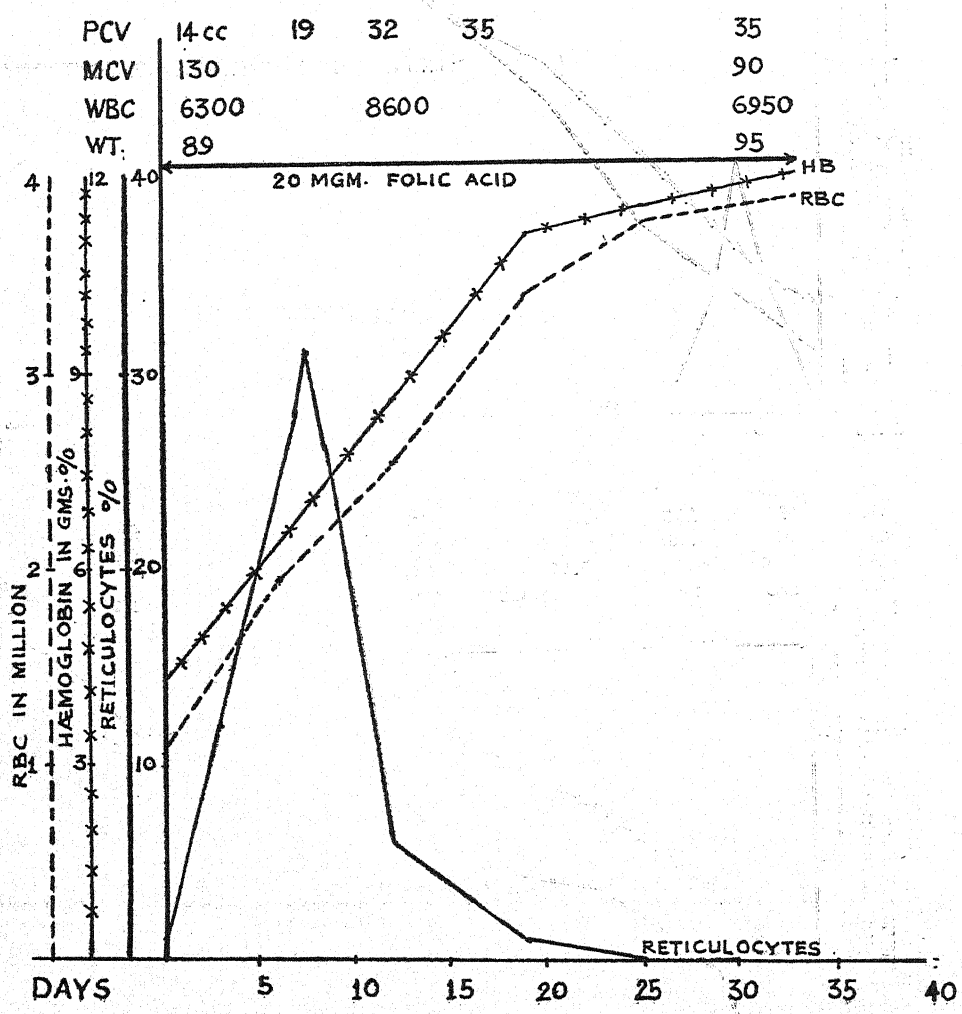
PCV	21	23	23	25	31
MCV	123			113	100
WBC	4700			9200	8600
WT	.84				85

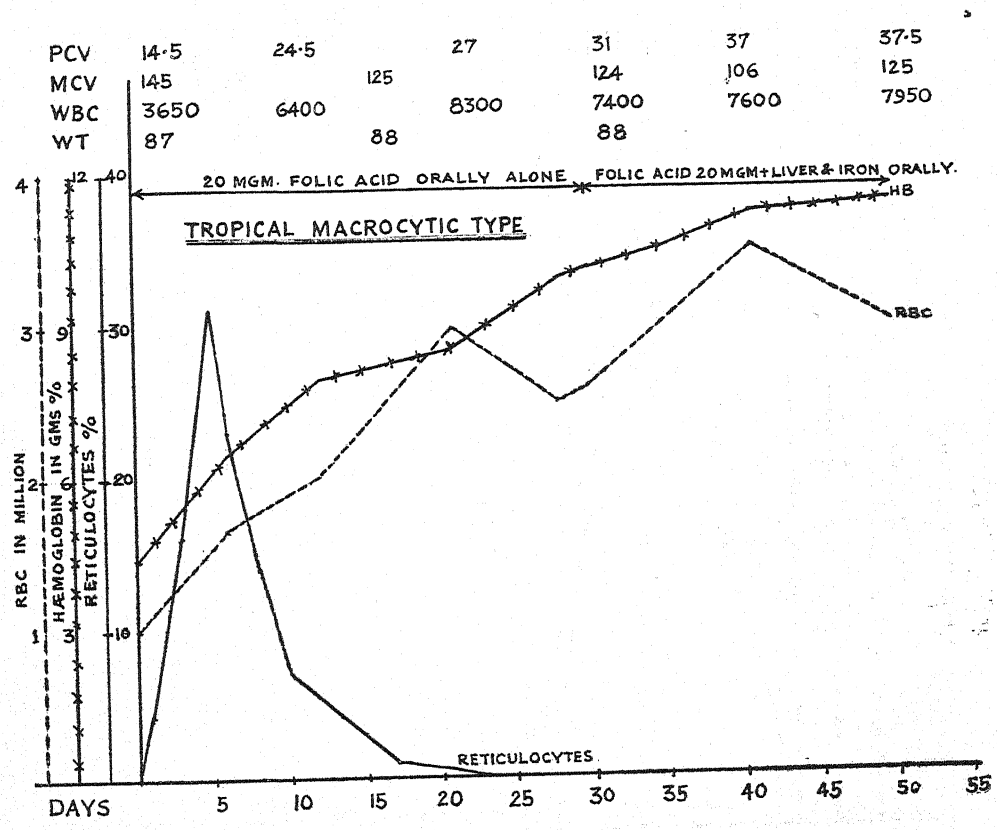



PCV 89 83 28 33 39 43
MCV 101 95
WBC 9400 6200 6400 7250
WT 94 97 98
PERNICIOUS ANÆMIA
20 MGM FOLIC ACID
IRON MIXTURE
ALONE IRON MIXTURE
HB
RBC
RETICULOCYTES
RBC IN MILLION
HÆMOGLOBIN IN GMS %
RETICULOCYTES %
DAYS
5 10 15 20 25 30 35 40 45 50 55 60 65 70


PCV 17 24·5 29 35 33·5 41
MCV 141 126 110 105
WBC 5100 7100 6400
WT 108 112 122 127 130
20 MGM FOLIC ACID DAILY
IRON ALONE
TROPICAL MACROCYTIC TYPE
HB
RBC
RETICULOCYTES
RBC IN MILLION
HÆMOGLOBIN IN GMS %
RETICULOCYTES %
DAYS
5 10 15 20 25 30 35 40 45 50 55 85 195

TROPICAL MACROCYTIC TYPE




PCV 14·5 24·5 27 31 37 37·5
MCV 145 125 124 106 125
WBC 3650 6400 8300 7400 7600 7950
WT 87 88 88
20 MGM. FOLIC ACID ORALLY ALONE
FOLIC ACID 20 MGM+LIVER & IRON ORALLY.
TROPICAL MACROCYTIC TYPE
HB
RBC
RETICULOCYTES
RBC IN MILLION
HAEMOGLOBIN IN GMS %
RETICULOCYTES %
DAYS
5 10 15 20 25 30 35 40 45 50 55

To get a true interpretation of peripheral blood picture, sternal myelogram is of utmost importance. In all these cases there was macrocytosis in peripheral blood. It is now known that it is not always necessary to have a megaloblastic bone marrow in all cases of macrocytic anæmia. Megaloblastic bone marrow is present in those macrocytic anæmia which are deficient in P.A. factor, *e.g.*, in Pernicious anæmia, sprue, pregnancy, tropical macrocytic anæmia, etc. Thus in this group of cases, there is macrocytic anæmia with megaloblastic bone marrow.

It is also known that macrocytosis is present when the reaction to an anæmia is brisk enough to give rise to a macronormoblastic marrow. Here the bone marrow is hyperplastic. Macrocytic anæmia here is not due to deficiency of the P.A. factor. Cases of Leukæmia, multiple myeloma, pellagra, syphilis, malaria, acute hæmolytic anæmia, etc., may exhibit peripheral macrocytosis with hyperplastic macronormoblastic reaction of bone marrow and thus belong to this group.

It is also known that macrocytic anæmia may be present with normoblastic bone marrow due to rapid pouring of reticulocytes in cases where hæmorrhage has occurred. In these cases one expects increase in reticulocytes in circulation.

Thus it is apparent from these facts that macrocytosis is outstanding with megaloblastic erythropœsis but may also be present, with vigorously reacting normoblastic bone marrow.

In this group of 21 cases of macrocytic anæmia 11 cases had mild or moderate megaloblastic bone marrow reaction, one case had hyperplastic macro normoblastic reaction while 9 cases had either hypoplastic or normal normoblastic bone marrow reaction. So in 9 cases there was neither megaloblastic nor macronormoblastic reaction and still they had macrocytosis.

On detailed inquiry about the previous treatment in this group of normoblastic cases, 3 cases had taken Liver injection, 6 to 20 injections within last 2 months, one case had some oral therapy, probably Liver powder and plastules, one case belonged to sprue and had some oral therapy while four cases did not have any therapy prior to admission.

One had hypoplastic and three had normal normoblastic bone marrow. Gastric analysis in all these four cases was normal. Two cases in this group belonged to hæmorrhagic type. One, belonged to Hæmolytic type. R.B.C. count in these cases were 1.4, 1.6 and 1.68 million respectively. It was not possible to interpret normal normoblastic bone marrow reaction with macrocytosis in the 4th case in this subgroup, as he had neither hæmorrhage, hæmolysis, nor any previous treatment—Gastric analysis showed hypochlorhydria. His R.B.C. count on admission was 2.72 mill. per cmm. (R.B.C. count rose to 4.44 mil. at the end of 30 days' treatment, in contrast to previous 3 cases where average R.B.C. rise was 1.0 mill. only at the end of the course). This shows that macrocytosis can occur

in presence of even normal normoblastic bone marrow. This has been already shown in first section of this work.

The distribution of the cases on admission as per Bone marrow findings are tabulated below. These cases are also correlated for iron-deficiency.

TABLE

Type of Bone Marrow.	Number of cases with normal saturation.	Cases with hypo-saturation.	Total.
Normal normoblastic	5	1	6
Hypoplastic „	2	1	3
Hyperplastic „	1	....	1
Mild Megaloblastic	3	1	4
Moderate „	6	1	7
Total	17	4	21

Besides complete hematological and sternal puncture examinations in each case, routine examination for urine, stool, gastric analysis, kahn test, van den Bergh and icterus index, blood iron and blood proteins were carried out wherever possible. The relevant findings are as follows :—

(1) *Gastric Analysis* :—There was complete achlorhydria for free Acid in 10 cases. Histamine Test could be done in 12 and histamine fast achlorhydria was found in 8 cases. 3 cases showed hypochlerhydria, 5 cases had normal Gastric curve while 3 had hyperchlerhydria. Out of those 10 cases who had achlorhydria, 2 were sprue type, and 8 were Dyshæmopoietic, one case in this group was Pernicious Anæmia, while rest were labelled as Pernicious type anæmia.

(2) *Kahn Test* was negative in all the cases.

(3) *Icterus Index* was 0 to 5 units in 5, 5 to 10 units in 8 while 11 to 20 units in 5 cases. So in 13 cases it was more than normal. 7 cases of this group had complete achlerhydria on Gastric analysis.

(4) *Blood Proteins*.—Plasma protein estimations were done in 19 cases on admission. Plasma proteins was below 5 gms. per 100 cc. in 12 cases, out of which 5 cases had edema on feet on admission. In 7 cases plasma proteins ranged between 5 and 7 gms. per 100 cc. blood.

(5) Blood-Iron estimations were done by Wonge's method in 19 cases. It ranged between 11 and 37 mgm. per 100 cc. blood according to severity of anæmia.

These cases are grouped as follows :—

CLINICAL GROUPS :—

I.	Dyshæmopoietic Type	18	
	(*a*) Chief defect in Intake		10
	(*b*) Chief defect in Absorption		3
	(*c*) Defect in Intake and Absorption		4
	(*d*) True Pernicious Anæmia		1
	(One Pernicious, 2 were of sprue and 15 were Tropical macrocytic type).		
II.	Hæmorrhagic Type	2	
	(*a*) Bleeding Piles		1
	(*b*) Menorrhagia		1
III.	Hæmolytic Type	1	
	(*a*) Malaria fever		1
	Total		21

(B) PATHOLOGICAL GROUPS :—

(1)	Macrocytic Hyperchromic Normosaturation type :	17
(2)	Macrocytic Hyperchromic Hyposaturation type	4
	Total	21

Incidence of various clinical manifestations in the cases and effect of Folic Acid on them :—

The chief symptoms on admission were either general weakness, Poor appetite, Stomatitis, Sore Tongue, Glossitis, Flatulence, Diarrhœa, Loss of weight and/or edema.

(a) *General Weakness.*—All the patients complained of general weakness, exhaustion, fatigue and diminished concentration. All the patients at the end of one week's course with folic acid started feeling well. Response was greater in the dyshæmopoietic group.

(b) *Appetite.*—All complained of either poor appetite or loss of appetite. All showed signs of improvement on 4th to 7th day of Folic Acid Therapy. This was maintained well in Dyshæmopoietic group, except in 2 cases. Appetite remained poor in the remaining.

(c) *Diarrhoea.*—7 cases had history of chronic diarrhoea, 4 cases had evidence of fatty diarrhoea out of which 2 were sprue cases. Frequency was 2 to 4 stools daily. In sprue cases, improvement started on 6th to 7th day of Folic Acid treatment. Frequency and amount of stools decreased, appetite improved. In two cases diarrhoea was associated with round worm infection and was not improved with Folic Acid but responded to specific therapy for worms. In 2 cases there was diarrhoea and achlorhydria with slight excess of fat in stools which responded to folic acid.

(d) *Stomatitis—Glossitis, etc.*—In 10 cases there was stomatitis coming off and on for 2 weeks to four months. In 2 cases there was recurrent stomatitis for 2 years. In 7 cases there was either glossitis, raw tongue or Sore-Tongue. Five cases had complete achlorhydria, one had hypochlorhydria and four had normal gastric curve. 7 cases showed normoblastic bone marrow while 3 had megaloblastic bone marrow. Stomatitis and Glossitis were present in hæmorrhagic group also. All these patients irrespective of any factor improved with Folic acid. Improvement started on 3rd day and in 8 cases lesions cleared up in 8 to 10 days. In one case lesion in mild form persisted while in one there was poor response. Atrophied papilæ in Tongue showed some signs of regeneration. As all these cases could not be followed nothing is known about recurrence of lesions.

(e) *Nails.*—Three cases had pale and flat nails on admission. Colour of nails changed in all cases but flatness was not much affected.

(f) *Pigmentation* was present around the nail beds in 13 cases on admission. In all the cases pigmentation was much reduced at the end of therapy. In three cases it disappeared completely.

(g) *Edema* on feet was present in 6 cases on admission. In 5 cases total plasma proteins was below 5 gms. per 100 cc. blood while in one it was 5.2 gms. per 100 cc. blood. As these cases improved with the therapy, edema disappeared in all within 10 to 15 days of therapy.

(h) *Effect on Weight.*—19 patients gained in weight ranging from one lb. to 19 lbs. at the end of 30 days' treatment. One patient had stationary weight while one patient who had marked edema on admission lost weight by 4 lbs. Details are given later on.

(i) *Miscellaneous Effects.*— All the patients except one definitely showed signs of improvement at the end of a week's treatment. No bad effect was observed in anyone.

Effects on Hematological Findings

(1) Effect on R.B.C. Count :—

Table I

R.B.C. in mill. per cmm.	Number of Cases on Adm.	Number of Cases at the End.	Rise in Number of Cases.
0—1	3	..	2
1—2	15	..	13
2—3	3	8	5
3—4	..	11	1
4—5	..	2	..
Total ..	21	21	21

Lowest R.B.C. count on admission was 0.48 mill. per cmm. which rose to 3.25 mill. per cmm. at the end of 30 days' treatment. Highest count was 284 mill. per cmm. on admission which rose to 3.94 mill. per cmm. at the end. Minimum rise in the series was 0.66 mill. per cmm. with 30 days' treatment. This case had macrocytosis, with normoblastic bone marrow and belonged to hæmolytic group. Maximum rise in the series was 3.2 mill. per cmm. in a macrocytic case with megaloblastic bone marrow, who belonged to Dyshæmopoietic group. This patient had 1.6 mill. R.B.C. per cmm. on admission. Average rise in R.B.C. count in whole series was 1.76 mill. per cmm. at the end of 30 days' treatment.

(2) *Haemoglobin.*—Effect on Hæmoglobin Values :—

TABLE II

Hb. in gms.%	Number of cases on admission.	Number of cases at the end of a month of therapy.	Number of cases with rise in Hb.%
0— 3	1	..	6
3— 6	7	..	10
6— 9	10	3	5
9—12	3	13	..
12—15	..	5	..
Total ..	21	21	21

Lowest Hæmoglobin value on admission was 2.72 which rose to 9.86 gms. per 100 cc. Highest Hæmoglobin value on admission was 11.56 which rose to 13.6 gms. per 100 cc. Minimum rise in Hb. was 1.36 gms. per 100 cc. while maximum rise was 7.48 gms. per 100 cc. Average rise in whole series was 4.42 gms. per 100 cc.

Reticulocytes Response to Therapy.—13 cases had 0% reticulocytes, 6 had upto 2%, one had 4% while one had 7.9% on admission. Reticulocyte percentage rose during the treatment from 2% to 31%.

Distribution of Reticulocyte Rise was as follows :—

Rise.	Number of Cases.	Maximum on day (average)	Myelogram.	
			Megaloblastic marrow.	Normoblastic marrow.
2% ..	2	8.5th day	..	2
2— 5% ..	6	6.8th day	1	5
5—10% ..	8	6.8th day	5	3
11—20% ..	2	6.5th day	1	1
21—30% ..	1	6.0th day	1	1
31% ..	2	4.5th day	2	..

White Blood Cells Count :—Distribution of W.B.C. count on Admission and at the end of 30 days' therapy was as follows :—

TABLE III

W.B.C. Count.	Number of cases on admission.	Number of cases at the end.	Rise in cases.
1 Upto 2000 per cmm.	..	..	7
2 2000—3000 per cmm.	1	..	2
3 3000-4000 per cmm.	5	1	8
4 4000-5000 per cmm.	5	1	1
5 5000-6000 per cmm.	3	..	..
6 6000-7000 per cmm.	3	5	1
7 7000-8000 per cmm.	2	3	1
8 8000-10000 per cmm.	1	9	..
9 10000-15000 per cmm.	1	2	1

Minimum W. B. C. Count in a hæmorrhagic type of case was 2850 which rose to 3200. Maximum W. B. C. count was 10900 per cmm which fell to 8500 per cmm. Minimum rise was 400 cells per cmm. while maximum rise was 7000 per cmm. This shows that in all cases except in two, there was rise in W. B. C. count also.

Packed Cell Volume :—Distribution of P. C. V. values and rise in them at the end of 30 days' treatment was as follows :—

TABLE IV

P.C.V. in cc. per 100cc.	Number of cases of admission.	Number of cases at the end.	Number of cases with rise in P.C.V.
5-10 cc.	2	..	10
11-15-cc.	5	..	4
16-20cc.	7	1	3
21-25cc.	4	4	4
26-30cc.	2	3	..
31-35cc.	1	7	..
36-40cc.	..	6	..
41-45cc.	..	..	..

Minimum P. C. V. was 8 which subsequently rose to 33cc per 100cc while maximum was 33cc which rose to 38 cc. Minimum rise was 3cc in a case which was hæmolytic type while maximum rise was 25cc per 100cc at the end of 30 days' treatment. Average rise in whole series was 12.25cc per 100cc blood.

Mean Corpuscular Volume :—M. C. V. Distribution.

TABLE V

M.C.V. in CM.	Number of cases on admission.	Number of cases at the end.
70- 80	..	4
81- 90	..	3
91-100	..	7
101-110	5	5
111-120	4	1
121-130	6	1
131-140	2	..
141-150	3	..
151-160	1	..

This table shows that M. C. V. was reduced in majority cases as the values have shifted to left. Maximum M. C. V. in the series was 160 cm which came down to 101 cM. M. C. V. at end of treatment went below 80 cm in 4 cases.

TABLE VI

Mean Corpuscular Hæmoglobin :—M. C. H. Distribution.

M.C.H. in YY.	Number of cases on admission.	Number of cases at the end of therapy.
Below 28	..	2
28-32	..	7
22-36	1	8
37-40	6	3
41-48	12	1
49-56	2	..

M. C. H. values have shifted to left as M. C. V. is reduced. Maximum M. C. H. was 54yy which was reduced to 35. Two cases even became hypochromic.

M. C. H. C. Value Distribution :—Mean Corpuscular Hæmoglobin Concentration.

TABLE VII

M.C.H.C.%.	Number of cases on Admission.	Number of cases at the end.
Below 32% ..	4	4
32 to 38% ..	17	17
Above 38% ..	..	..

4 Cases were hyposaturation type on beginning, out of which two remained hyposaturated at the end while two became normally saturated. Two normal saturation type of cases on admission became hyposaturated at the end of 30 days'course.

Effect on different white blood Cells :—Differential W. B. C. Count was done in each case on admission and once every week during treatment. Findings on admission and at the end of treatment were compared.

It was observed that along with rise in total W. B. C. count in majority cases polymorphonuclear count also increased; while Lymphocytic count looked as if decreased; but absolute lymphocytic count in majority was not much affected. There was also rise in Eosinophilic count in these cases.

STERNAL MYELOGRAM IN RELATION TO PERIPHERAL BLOOD PICTURE ON ADMISSION AND EFFECT OF FOLIC ACID ON THIS :—

All the cases are grouped under two chief reaction groups :—

(1) Normoblastic reaction (2) Megaloblastic reaction.

Normoblastic type includes

(i) Hyperplastic normoblastic (Normal type cells)
(ii) Hyperplastic macronormoblastic
(iii) Normal normoblastic
(iv) Hypo normoblastic.

Megaloblastic reaction is subdivided as

(i) Predominantly megaloblastic
(ii) Moderately megaloblastic
(iii) Mild megaloblastic.

Here we have made an attempt to show the difference in effects of the drug in patients with macrocytic anæmia with varied etiology and different types of sternal myelograms.

There were cases of untreated macrocytic anæmia in absence of either megaloblastic or macronormoblastic bone marrow reaction in this series.

Out of 21 cases 6 had normal normoblastic reaction. In this normal normoblastic group, 4 were dyshæmopoietic type (two of these had liver injections prior to admission). One was hæmorrhagic type and one of hæmolytic type.

One showed hyperplastic normoblastic reaction. It was of dyshæmopoietic group and had no therapy prior to admission.

Three cases showed hypoplastic normoblastic reaction. Two of these were dyshæmopoietic type and they had liver therapy prior to admission. Third case was of hæmorrhagic type.

Thus in all 11 cases belonged to "Normoblastic reaction group". While 10 cases showed megaloblastic reaction, 4 had mild and 6 had moderate megaloblastic reaction. All were of dyshæmopoietic type. Four cases on this group had liver therapy prior to admission.

Effects of Folic Acid on this various types of cases are shown in table IX and in accompanying graphs which represent different groups.

TABLE IX

Effect of Folic Acid on Macrocytic Anæmia according to Bone Marrow Reaction.

Bone Marrow Reaction.	Normoblastic.					Megaloblastic.	
	Normal Normoblastic type.		Hyperplastic.	Hypoplastic.		Mild.	Moderate.
Clinical Type.	Dyshaemopoietic. (Dysh.)	Hæmorrhagic or Hæmolytic.	Dyshaemopoetic.	Dysh.	H-gic and lytic.	Dyshaem.	Dyshæmo.
Number of cases in respective groups	4	2	1	2	1	4	7
Average rise R.B.C. in mil. per cmm.	1.6	0.79	2.4	1.3	1.4	2.43	1.83
Hb. in Grams%	3.48	2.12	7.48	2.55	4.08	6.34	4.51
P.C.V. in ccs. per 100 cc.	9.9	5.5	24	7.5	10	18.75	12.85
Weight in lbs.	12.5	5	6	9	1	6	7.3
Max. Reticulocyte% ..	9.6%	7.7%	9%	5.5%	2%	17.2%	8.5%
Day on which	6th	6th	10th	6.5th	6th	6th	6th

Average rise in respective groups.		
R.B.C. per cmm.	1.44 mill.	2.05 mil.
Hæmoglobin	3.48 gms. per 100cc.	5.18 gms.
P.C.V.	9.95 ccs. per 100cc.	15.0cc.
Weight	8.5 lbs.	6.82 lbs.
Max. Reticulocyte% ..	5.5%	12.4%
Day on which	7th day	6th

The following rough conclusions can be drawn from this table as well as associated observations :—As the series is too small, absolute reliance cannot be put on this.

(1) Response in macrocytic anæmia with megaloblastic bone marrow is better than in those with normoblastic reaction.

(2) Response in mild megaloblastic type cases was better than in moderate megaloblastic type of cases. Response in those cases who had no liver injections was better than in those who had liver injection prior to Folic Acid Therapy.

(3) Hyperplastic macronormoblastic Dyshæmopoietic type of case had very good effect with Folic acid.

(4) Response in macrocytic normoblastic type with hæmorrhagic or hæmolytic etiology was poorest of all while macrocytic normoblastic Dyshæmopoietic type responded better than former but poorer than megaloblastic group.

(5) Response in cases with below 2 mill. R.B.C. count and above 2 mil. R.B.C. count per cmm. was practically same.

(6) This shows that all macrocytic anæmia of Dyshæmopoietic type responds, more or less to Folic Acid Therapy. This is shown in few graphs at the end.

Sternal puncture was repeated in 17 cases after 20 days' Therapy with Folic Acid. All normoblastic normal type remained same. Hyperplastic Normoblastic reaction in one became normoblastic normal type. While 3 cases of hypoplastic normoblastic reaction became normal normoblastic type. Megaloblastic Bone marrow returned to normal normoblastic. Thus in cases of abnormal bone marrow reaction, it was restored to normal type. Thus it is observed that effect in macrocytic cases with megaloblastic bone marrow was better than in other groups. Folic acid acted well also in other nutritional macrocytic anæmia with normoblastic bone marrow. This suggests that this group of cases might be suffering from similar if not same deficiency.

Follow Up.—Unfortunately our cases did not turn up for reporting. One case is followed up for last 8 months. He had many relapses of anæmia. He belonged to nutritional macrocytic type with megaloblastic bone marrow. He had 30 days' course with folic acid and then after iron for a month. He had no therapy since then and he has maintained his blood count on the same level for last 8 months. The other patients reported for follow up only for a month or two and so are not included in this work.

SUMMARY

(1) 21 cases of macrocytic type Anæmia were treated with Folvite (Synthetic Folic Acid preparation of Lederle).

(2) An uniform dose of 20 mgm. Folic Acid daily was given for 30 days along with usual hospital diet. No other therapy was supplemented during this period.

(3) All cases were thoroughly investigated for type and etiology treatment was started. Sternal puncture was done in all cases.

(4) Out of 21 macrocytic anæmia cases, one was of true pernicious anæmia, 2 were of sprue syndrome, and 15 were nutritional deficiency anæmia. Thus 18 cases were due to Dyshæmopoiesis. Two cases had hæmorrhagic while one was hæmolytic type.

(5) 17 cases had normal saturation with iron while 4 had hyposaturation with iron.

(6) 11 cases showed megaloblastic bone marrow reaction, 9 had normoblastic reaction, and one had macronormoblastic reaction.

(7) Effect of Folic acid on various symptoms is described. Improvement was noted within a week of therapy.

(8) Effects on R.B.C., Hb., W.B.C., etc., are described in details according to various types and grades of anæmia. Moderate as well as severe cases responded well.

(9) Reticulocyte count increased in 19 cases and maximum peak was noted between 6 and 8 days.

(10) M.C.V. index was lowered down with therapy.

(11) Sternal puncture study showed different types of reaction in beginning. At the end of therapy all showed normal reaction, *i.e.*, it was restored to normal.

(12) It was observed that all nutritional macrocytic anæmia responded to some or less extent to Folic Acid, while those who had hæmorrhage or hæmolysis as etiology responded very poorly.

(13) In nutritional group, the cases with megaloblastic bone marrow responded somewhat better than those with normoblastic bone marrow.

(14) Average rise in R.B.C., Hb., W.B.C., P.C.V., and weight in all these groups is shown in tables.

(15) All these tables show that :—

(*a*) Macrocytosis may exists even in presence of normal normoblastic bone marrow reaction, and this type of cases who have nutritional dyshæmopoiesis do respond to Folic Acid.

(*b*) Macrocytosis occurs in cases of hæmorrhagic and hæmolytic types of anæmia, but these cases do not respond satisfactorily to Folic Acid.

(*c*) Response to Folic acid therapy is best in nutritional macrocytic anæmia with megaloblastic bone marrow.

(16) Maintenance of effect :—

One case of nutritional macrocytic type with megaloblastic bone marrow, who had frequent relapses previously was remarkably improved on treatment with Folic acid. He has maintained that health without any further relapse for last 8 months after one month's course last year. He had no therapy with any drug for last 8 months. Other cases we could not follow up as they failed to turn up for reporting.

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RURAL MEDICAL RELIEF IN BOMBAY PROVINCE

By

DR. CHAMANLAL MEHTA

1. Health Survey and Development Committee instituted by the Government of India and presided over by Sir Joseph Bhore published their report in 1946 and made the following remarks in the introduction to their recommendations :—

"We desire to avoid any semblance of special pleading in the emphasis we place on the paramount importance of health in any plan for future development of the country. We realise that the most effective progress postulates a closely co-ordinated advance in which complimentary efforts in many fields must be correlated if the national development front is to move forward steadily, smoothly and with the greatest volume of practical achievement.

Nevertheless we feel that the nation's health using the term to signify that positive state of well being in which mind and body are able to function to their fullest capacity is perhaps the most single factor in determining the character and the extent of its development and progress.

Expenditure of money and effort in improving nation's health is giltedged investment which will yield not deferred dividends to be collected years later, but immediate and steady returns in substantially increased productive capacity. The modern trend in all countries in the world is towards the provision by the state of as complete a health service as possible and the inclusion within its scope of the largest possible proportion of the community. The need for ensuring the distribution of medical benefits to all irrespective of their ability to pay has also received recognition."

The Advisory Planning Committee of the Government of India presided over by Mr. K. C. Neogy in their recommendations as regard objectives and priorities, included public health in the list of subjects of priority No. 1.

2. Bombay Government published in 1947 their five year plan for Post-War Reconstruction. In the foreward the Minister for Reconstruction dividing the schemes in three groups included the medical and public health in the group of Nation Building Services.

In the press note issued in 1946 by the Government of Bombay the Government declared "the village will be the focal point of the plan and rural development will be pressed forward vigorously so as to provide the villages with all the necessaries and as soon as possible thereafter also with all the amenities of an enlightened and

cultural social life". Further on, in the press note, it has been observed that "The sole criterion by which any scheme will be judged is the concrete contribution it makes to the physical and moral well being of the people."

How far has the Bombay Government worked in this direction ?

3. The British Government in India had started a few dispensaries in the rural areas in the province. There was no plan made on either the population or the density of population bases. These dispensaries, for long, have been handed over to the Municipalities or the Local Bodies. The latter having poor finances, new dispensaries could not be started, and those existing deteriorated.

4. As the dispensaries did not increase in number, and medical relief did not reach the rural areas, the Government started a *Subsidised Medical Practitioners Scheme*. Under the scheme doctors were given a certain remuneration per month and a certain amount towards the cost of drugs. They were to start their practice at a certain village. A contract was made with him for seven years. In the beginning doctors trained in modern medical science were admitted. Later it was made open to Vaidyas and Hakims of the schools of Ayurvedic and Unani Medicine started by the Government of Bombay in 1938. Even this scheme did not attract the doctors of any system in sufficient numbers.

5. Then the Cottage Hospital scheme was introduced. A few of the dispensaries were improved upon, some beds were provided and doctors of B. M. S. Class II were posted in charge. There were no plans in starting these hospitals. Five were opened and that too in towns.

6. When the British Government retired, there were in Bombay Province

461 hospitals and dispensaries under Local Boards and the Government.
333 Subsided Medical Practitioners.
5 Cottage Hospitals.

7. Since the popular ministry took over charge what has been done to put the preventive and curative medical service in rural areas on a sound and scientific bases ?

8. Extra grant was given for the dispensaries handed over to the Local Bodies. Local Boards having small finances, there has been no increase in the number of dispensaries. They have also adopted the Subsidised Medical Practitioners Scheme. The Government is not starting any more dispensaries.

9. Subsidised Medical Practitioners posts are increased. It has not gained popularity. Very few medical men of even the indigenous systems of medicine are attracted to it ; much less from those of modern medicine. Quite a big number of these posts are vacant.

10. As the Subsidised Medical Practitioners Scheme did not adequately serve the purpose, *Village Aid Scheme* was introduced. Under this scheme 400 primary school teachers were provided with medical chest and a small course in the use of medicines was given to them.

11. Another scheme called *Sub-Dispenser's Scheme* has received a favourable response from the popular Government. According to this scheme, social workers will be given an allowance of Rs. 10 per month and a medical chest. They are to render medical relief to the villagers when they go round for their social work.

12. A fourth scheme in their plan is to start a *Mobile Medical and Surgical Unit*, which will move from areas to areas in the rural parts of the province and render medical and surgical treatment. It will be stationed in one area for three months continuously. There are three Mobile Medical Units for emergency epidemic purposes. These will be sent out wherever and whenever epidemic breaks out.

13. It seems there is a desire to continue the cottage hospital scheme. So far one more cottage hospital has been added to those already existing.

14. At present there are in Bombay Province—

461 hospitals and dispensaries—no increase.
6 Cottage Hospitals—increase of one.
333 Subsidised Medical Practitioners—no increase.

15. Many of the schemes mentioned above are unscientific and are bound to fail in their object. Others need very badly a scientific plan for its implementation. These unscientific schemes do not do credit to the reputation of the eminent physician who presides over the Bombay Government's Health Ministry.

16. Why should the value of life of a person in rural area be considered insignificant or of less value than that of his brother in the urban area ?

17. The Government is conscious that they are tinkering with the problem of the rural medical relief and they put forward the following reasons for their failure to implement their promises or act upto their principles laid down in their press note referred to in para 2 above :—

(1) Shortage of medical personnel.
(2) Shortage of nurses and midwives.
(3) Unwillingness of medical profession to go to the villages.
(4) Stringency of finances.

18. If one is to discuss herein all those points in detail, this article will be too long. It seems that no considered and serious attempt is made by the Government to solve those difficulties. They have not tried to understand the reasons why the medical and the nursing professions do not go to the villages.

19. Some of the suggestions I would like to make to the Government, are given hereunder. They are almost on the lines of those suggested by the Indian Medical Association, the representative organisation of medical profession in India and in Bombay Province. Some of the other provinces have accepted them and have profited by having taken the I.M.A—in their confidence and co-operation. Why should the Government of Bombay fight shy of a similar step? I. M. A. is neither a political nor a sectarian organisation struggling to get power. It has always stood for constructive work in the alleviation of the suffering of the sick and promotion of positive health.

20. Suggestions :—

i. The Government should constitute a medical advisory committee. On which the representatives of the I. M. A. in the Bombay Province be invited.

ii. Let the Government invite the nominees of the I. M. A. on the Provincial and District Reconstruction Boards. Medical Committees of these Boards be formed.

iii. The Medical advisory Committee of the Government and the Medical Committee of the Provincial Reconstruction Board should prepare a comprehensive plan for the medical relief and public health problems of the rural areas. These plans must be based on the consideration of the population and density of population in a square mile, keeping in mind the ideal of making the village a focal point as announced by the Government in its press note referred earlier in these pages. The plan should be complete for each district with a map on which the location of dispensaries, cottage hospitals, health centres and hospitals are dotted.

iv. Relieve the Local Bodies of the responsibilities of rendering medical relief, just as education from them is taken away by the Government. They can never do it efficiently as they have very inadequate fund for the purpose. They will be willing to hand over them to the Government.

v. Scrap all those schemes which the Government has approved if they cannot be considered scientific.

vi. Dispensaries, Cottage Hospitals, Health Centres and Hospitals, their location well planned and their working co-ordinated are the only measures which will provide the rural population the required medical relief.

vii. Let the Government invite the representatives of the I. M .A. in Bombay Province or those members of the medical profession who may have studied these problems properly, to a round table discussions, understand with an open mind the difficulties of the profession in going to the villages and other relevant problems.

ix. When the comprehensive plans are ready, the Government should declare the scheme for implementing them. It may be distributed through a number of years and particular areas may be given preference according to their needs. But whatever is done must fit into the plan.

The existing facilities if fit into the plan should be developed to the required standard. Those that do not fit should either be removed to locations fitting into the plan or be scraped. Whenever donations are offered, the donor's selection of the purposes for which they are offered and locations which they select must fit into the plan. This needs a bolder attitude to be adopted by the Government.

As the Government of Bombay has the good of the people at heart and has the desire to put into force a really useful medical relief and adopt measures for the prevention and promotion of health, such a bold policy will have to be adopted. The philanthropists will soon understand the importance of such a policy and will co-operate with the Government.

DIGESTIBILITY OF GUJARATI FOOD PREPARATIONS

A SCHEME FOR RESEARCH

By

J. D. PATHAK

On the occasion of the 10th Anniversary celebrations of the Gujarat Research Society the desirability of extension of research work in different problems of nutrition was emphasised by many speakers. Among these Dr. B. B. Yodh had suggested that digestibility of our foods may be investigated. The present scheme is the outcome of this suggestion.

The previous researches published in the Journal of the Gujarat Research Society have established that a great portion of the weak condition of health of middle class Gujarati Hindus is due to defective diet, namely, low protein content, lack of leafy vegetables and excess of fried preparations with a heavy intake of fats.

A research in digestibility of the food preparations as taken in middle class Gujarati household is considered essential to make further improvement in the health of the community.

2. *Nature of the Research.*—All foods are not digested in the stomach uniformly. In health the rate of digestion depends upon the type and the physiological state of the stomach and also on the article of diet. Certain articles are better digested and leave the stomach earlier than others. The lay mind has already recognised this fact and foods have been accordingly classified as light or heavy, *i.e.*, easy or difficult to digest. Thus rice is light and wheat is heavy. 'Fulka' are lighter than 'chapati or puri'; milk is lighter than 'shreekhand or basundi'; 'mug' is lighter than 'val or chola, etc'. Numerous examples could be quoted. It is on such notions that the recommendation of food in health and disease is made. The views have not been tested scientifically so far.

Since 1893 when Beaumont published his classical observations on the gastric digestion on Alexis St. Martin, many observers have studied the response of the stomach to various foods. Digestion of almost all foods commonly taken in the West has been investigated. As Mottram and Graham state "the results of such a study destroy some popular beliefs . . . . " Thus 100 gms. of beef and lamb were both digested in about the same time whereas chicken and ham took ten minutes longer. Roast beef was digested about the same time whether it was underdon, medium or well done. Bacon took nearly one hour longer to digest than beef. Two eggs cooked in various ways were digested 10 minutes quicker than 100 gms. of beef. Vegetables as a whole left stomach in two hours but cabbage and asparagus were got rid off in 1½ hours.

"The observations on digestion of milk were most interesting. The curds from raw milk were like rubber and as big as a man's thumb, but those obtained when the milk had been boiled for 5 minutes were soft and no bigger than a pea, etc. The observation on pies showed that the pie crust was evacuated in 2 hours and 52 minutes; while the fruit portion was got rid of in 26 minutes less time.

Mashed potatoes are more rapidly disposed of than boiled and that old potatoes are better tolerated than new. Firm bread and biscuits are found to be digestible than new bread, etc."

The results have been showed in a tabular form below :—

RATES OF DIGESTION OF FOODS

Evacuation time and highest total acidity for various artictes of diet

Articles of diet (100 gms. portions unless otherwise stated).	Number of Observations.	Average (Evacuation time).	Highest total acidity (average) cc. N/10 alkali to neutralise 100 cc. Juice.
Beef and Beef Products	25	3.00	120.0
Lamb and Lamb Products	14	3.00	135.0
Veal : (*a*) Market	7	2.50	140.0
(*b*) "Bob"	7	3.20	110.0
Pork & Pork Products	31	3.15	120.0
Chicken	20	3.15	125.0
Turkey	2	3.30	140.0
Guinea Hen	2	4.00	110.0
Fish	75	2.50	130.0
Cow's Milk 75 c.c.	3	1.15	45.0
400 c.c.	50	2.30	100.0
Mother's Milk 150 c	5	1.40	60.0
225 c.c	2	2.25	90.0
Gelatin	5	2.00	70.0
Eggs and Egg Combination	90	2.40	80.0
Vegetables prepared in different ways ..	124	2.50	75.0
Fruits	68	2.00	90.0
Bread & Cereals	75	2.40	80.0
Cakes	29	3.00	90.0
Pies	29	2.30	90.0
Puddings	23	2.20	90.0
Sugars & Candies	28	2.05	70.0
Ice Creams	7	3.15	105.0
Ices	4	2.35	65.0
Nuts : 25 grammes	18	3.00	100.0
500 grammes	4	4.00	....

3. *The Problem.*—The digestibility of various Indian articles of diet has not been investigated so far. It is proposed, therefore, to study the digestion of some common foods taken here. Such an investigation will no doubt be of utmost help in advising diet in health and disease—which so far is guided by beliefs unsupported by scientific proofs.

In the first instance digestibility of the following articles may be examined :—

Milk : simple, boiled, curds, mava, shreekhand, basundi.

Cereals : rice—(1) undercooked, (2) cooked in plenty of water, (3) pauva, (4) chevda.

Wheat : fulka, puri, chapati, bati, bread, shira, ladu.

Pulses : tur, mug, val, vatana, chola, grams cooked in different ways.

Vegetables : commonly used in Bombay and cooked in the usual way taken by people. Effect of adding sugar to vegetables cooked with salt—as is the custom in Gujarat.

Fish : commonly used in Bombay and cooked in the usual way taken by people.

Fried articles : Digestibility of fried articles and 'Farsans'.

At present response to the above articles may be studied but some articles may be added, omitted or altered as found convenient.

4. *Methods.*—The gastric digestion is studied in two ways :—

(1) By drawing samples for examination at intervals after passing a rehfuss tube into the stomach, and

(2) By screening or X-raying the stomach for progress of the food which is rendered opaque by addition of a small quantity of barium.

Persons who volunteer as subjects in the investigation will be normal, healthy adults, with normal stomach. After a thorough clinical overhaul their gastric response to standard test meal will have to be studied before making further investigations. Same amount of food (say 100 grammes) will be given and samples collected at 15 minutes intervals. The observation will have to be repeated for 3 occasions for each article studied in each subject and average of observations on several subjects be taken.

All the examinations will have to be made under similar circumstances, *i.e.*, usually in morning on empty stomach. It may take 2-4 hours for collection of samples which will have to be analysed soon after collecting them. The samples will be examined for quantity, colour, free and total acidity and bile, and the state of digestion of the articles of food consumed.

X-ray.—A small quantity of barium when mixed with food renders the stomach outline visible on screening and X-ray. The addition of small amount of barium does not interfere with state of digestion and gastric mobility (Evans).

This work is proposed to be carried out in the Physiology Department of Medical College, under the guidance of the Professor of Physiology and with the co-operation of X-ray specialist.

Some medical students have volunteered as subjects. Sufficient subjects will be found on payment, otherwise.

The observations will be extended for 2 years for collecting sufficient information.

5. *Estimated Cost.*—

		Rs.
(1)	*Assistant*: Research Assistant, B.Sc. (Physiology) or M.B.B.S. with X-ray and Pathology training Rs. 250 plus D.A.	3,600
(2)	Expenses of cook & other service, &c., Rs. 50 ..	600
(3)	Provision for payment to subjects in case sufficient volunteers do not turn up, should be made. For each sitting Rs. 1/8 may be granted. If 4 persons are called on each working day, Rs. 150 p. m. ..	1,000
(4)	Cost of Food	750

It is difficult to state exactly the cost of each article and amount needed in each case. An illustration will suffice. *e.g.*, Digestibility of 'Shrikhand' is to be studied. At least 3 observations in each of 6 subjects will be needed, *i.e.*, $\frac{1}{2}\times 6\times 3=9$ lbs. of the article. It costs Rs. 2/8- to 3/- per lb. in the market, *i.e.*, approximately Rs. 30/- for this article only.

For articles prepared from :—

Milk —6 to 8 preparations .. 30×8=Rs. 240.

Cereals, Wheat, Pulses, Fruits, Vegetables } do.

(5)	Equipment :—	
	For gastric analysis: rehfuss tubes, syringes, test-tubes, rack, beakers, burettes, stands, and chemical reagents, &c.	550
	Stationery, etc.	150
	X-ray plates, Barium, etc.	250
	Utensils	100
(6)	Miscellaneous	250
		Rs. 7,250 p. a.

The cost of investigation in the second year will be less as expenditure on equipment, etc., will be saved. The total estimate, therefore, may be put at Rs. 12,000 for 2 years approximately. Expenditure on different items may be adjusted to suit the budget.

SUMMARY

1. All foods are not digested in the stomach uniformerly. The gastric response varies with the state and type of stomach and the article of food. The lay mind has already recognised this fact and classified foods as light or heavy, *i.e.*, easy or difficult to digest. The rate of digestion of almost all articles of Western foods has been closely studied by various observers. The results have destroyed some popular beliefs. In India food is recommended in health and disease on beliefs which have not been substantiated by scientific proofs. Hence similar observations on articles of Indian foods will be of utmost help in prescribing diet in health and disease.

2. It is proposed therefore to study the digestion of various common articles of diet. A detail of the nature of work has been put down. Each observation will have to be made several times in a number of subjects. The rate of digestion will be studied by (1) fractional gastric analysis (2), X-ray.

3. Approximate cost of this enquiry which may need to be extended to about 2 years is Rs. 12,000.

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અમદાવાદ અને મુંબઇના મેડિકલ વિદ્યાર્થીઓનો ખોરાક

ડૉ. જે. ડી. પાઠક

ગૂજરાત રિસર્ચ સોસાયટીના આરોગ્ય કેન્દ્ર તરફથી મુંબઇના મધ્યવિત્ત કુંટુંબોની આહાર વિષયક તપાસનો હેવાલ આ અંકમાં બીજે આપવામાં આવ્યો છે, તેમાં અન્નાહારી કુંટુંબોનો ખોરાક કેટલો ખામીભર્યો છે તે ચર્ચવામાં આવ્યું છે.

લગભગ એજ અરસામાં મુંબઇ અને અમદાવાદની મેડિકલ હોસ્ટેલોના ખોરાકની તપાસ કરવામાં આવેલી. તેનું પરિણામ આ લેખમાં દર્શાવ્યું છે. આ હોસ્ટેલોમાં રસોડાં વિદ્યાર્થીઓ પોતે ચલાવે છે. મેડિકલ વિદ્યાર્થીઓ સાધારણ રીતે બીજા વિદ્યાર્થીઓ કરતાં વધુ ખરચી શકે છે. તેમનું આહારનું જ્ઞાન પણ બીજા કરતાં સારૂં હોય એમ સહેજે આશા રાખી શકાએ. તેથી તેમના ખોરાકની તપાસ ઘણી સુચક છે. બીજા ઓછું ખર્ચ કરી શકે તેવા વિદ્યાર્થીની હોસ્ટેલોનો ખોરાક આથીએ ઉણપ ભર્યો હશે, એમ સહેજે અનુમાન કરીએ તો તેમાં કંઇ ખોટું નથી.

સંક્ષિપ્તમાં હેવાલ નીચે મુજબ છે.

૧ **અમદાવાદ** મેડિકલ હોસ્ટેલમાં ખોરાકની તપાસ સપ્ટેમ્બર ૧૯૪૬ માં દશ દિવસ ખોરાક માપી કરેલી. ત્યાં ત્રણ કલબો (રસોડાં) હતાં બે અન્નાહારી, એક મિશ્રાહારી. આમાં ૯૧ વિદ્યાર્થીઓ જમતા. ૭૦ અન્નાહારી, બાકીના મિશ્રાહારી હતા.

અન્નાહારીઓનો ખોરાક મધ્યમવિત્ત ગૂજરાતીઓના જેવોજ હતો. સવારના ચા ને કંઇક નાસ્તો, બપોરના દાળભાત રોટલીને શાક, સાજનાં એજ મુજબ અગર તો ખીચડીને કઢી, દહિં શાક કે પુરીને દૂધ. શાક ફરસાણનો ઉપયોગ છૂટથી થતો. મિશ્રાહારીનો ખોરાક લગભગ અન્નાહારીને મળતો હતો. તપાસના ૧૦ દિવસ દરમ્યાન એજ દિવસ અન્નાહારીઓને ન મળે તેવું ભોજન આપવામાં આવેલું. આ ત્રણે રસોડામાં જમતા વિદ્યાર્થીઓનું રસોડા ઉપરાંત બહાર જે કંઇ લેતા તેની ગણત્રી કરી દિવસના કુલ પોષણના આંકડા ટેબલમાં દર્શાવ્યા છે.

૨. મેડિકલ હોસ્ટેલ–ટોપીવાળા નેશનલ મેડિકલ કોલેજ, મુંબઇ–આ કોલેજની કલબની તપાસ સપ્ટેંબર ૧૯૪૭ માં ૧૦ દિવસ માટે કરેલી. તેમાં ૪૧ અન્નાહારી અને ૫ મિશ્રાહારી વિદ્યાર્થીઓ જે બંને ટંક જમતા હતા તેમનો આખા દિવસનો કુલ (કલબ ને બહારનો) ખોરાક નોંધવામાં આવ્યો હતો. તેમનો પણ ખોરાક મધ્યવિત્ત ગુજરાતીઓના જેવોજ હતો.

હોસ્ટેલમાં જમતા વિદ્યાર્થીઓ લગભગ સરખી ઉમરના જુવાનીઆઓ હોવાથી તેમના ખોરાકની ગણત્રી કરવી સહેલી પડે છે. કારણકે તેમાં જુદી જુદી નાની મોટી વયના માણસો કે સ્ત્રીઓ માટે ઠરાવેલા અંકની ભાંજગડમાં પડવું પડતું નથી, તેથી તેમના ખોરાકના ગુણની ગણત્રી સહેલ અને સર્વમાન્ય થઇ પડે છે.

ગૂજરાત રિસર્ચ સોસાઇટી તરફથી ૧૯૪૧ માં થયેલી મધ્યવિત્ત ગુજરાતીઓના ખોરાકના તપાસના આંકડા પણ સાથે સાથે સરખામણી માટે મૂકયા છે. અમેરિકન ન્યુટ્રીશન રિસર્ચ કૌંસિલની ભલામણના આંકડા પણ આપ્યા છે. એ ઉપરથી આપણા જુવાન વિદ્યાર્થીઓના પોષણમાં શી ખામી છે તે સહેજે જોઇ શકાય એમ છે.

મેડિકલ હૉસ્ટેલોનો દિવસનો માથાદીઠ ખોરાક

સ્થળ		પ્રોટીન ગ્રામ	ફેટ	કાર્બોહા-ઇડ્રેટ	કૅલ્શીઅમ	લોહ	વિટામિન અ	વિટામિન બ૧	વિટામિન ક	કૅલરી
અમદાવાદ										
મેડિકલ કૉલેજ	કલબ ૧ અન્નાહારી (૪૫ વિદ્યાર્થીઓ)	૫૬.૫ (૬. પ્રાણીજ)	૧૧૪.૯	૪૧૫.૪	૦.૭૨	૩૬.૧	૧૨૪૬	૬૭૫	૩૦	૨૯૮૬
	કલબ ૨ ,, (૨૫ વિદ્યાર્થીઓ)	૬૦.૭ (૪.૨૩ પ્રાણીજ)	૧૦૧.૪	૩૭૫.૬	૦.૬૫	૨૯.૪	૮૫૯	૭૨૧	૨૪	૨૭૩૮
	કલબ ૩ મિશ્રાહારી (૨૧ વિદ્યાર્થીઓ)	૬૩.૫ (૯.૫ પ્રાણીજ)	૭૦.૭	૩૯૩.૦	૦.૮	૨૭.૭	૬૮૦	૫૯૦	૩૬	૨૫૩૨
મુંબઇ–નેશનલ										
મેડિકલ કૉલેજ	અન્નાહારી (૪૧ વિદ્યાર્થીઓ)	૬૬.૭૪ (૧૦.૭૪ પ્રાણીજ)	૧૧૩.૦૬	૩૮૬.૦	૦.૮૯૬	૩૩.૬૪	૨૦૨૮	૨૮૪.૨	૭૬.૯	૨૯૦૬.૪
	મિશ્રાહારી (૫ વિદ્યાર્થીઓ)	૭૧.૪૨ (૧૪.૭૪ પ્રાણીજ)	૧૧૪.૨૬	૩૯૫.૩૪	૦.૭૩૦	૩૪.૫૯	૨૧૬૭	૩૨૬	૭૯.૪	૨૯૩૦.૪
ગુજરાત રિસર્ચ સોસાઇટી, મુંબઇમાં										
મધ્યવિત્ત કુટુંબનો ખોરાક ૧૯૪૧		૬૧.૧ (૬.૯૬ પ્રાણીજ)	૮૨.૬૩	૩૮૫.૬	૦.૭૪૧	૩૪.૮	૧૫૦૮	૫૫૫	૪૯.૫	૨૫૫૦.૭
અમેરિકન ન્યુટ્રીશન રીસર્ચ કૌંસિલની ભલામણ—										
પુખ્ત ઉમરના મનુષ્ય માટે		૭૦			૦.૮	૧૨	૫૦૦૦	૪૦૦	૭૦	૩૦૦૦
૧૬-૨૦ વરસની ઉમરના છોકરાઓ માટે		૧૦૦			૧.૪	૧૫	૬૦૦૦	૬૦૦	૧૦૦	૩૮૦૦

સૌથી પ્રથમ તો આ બંને સ્થળે અપાતા ખોરાકનું સામ્ય ધ્યાન ખેંચે છે. જુજ ફેરફાર સિવાય મુંબઇ ને અમદાવાદની કોલેજના ખોરાકમાં કંઇ ખાસ ફેર નથી.

આ તપાસ વખતે બંને સ્થળે ૧૮–૨૨ વરસની ઉમરના વિદ્યાર્થીઓ હતા. તેમનું કામ બીજા વિદ્યાર્થીઓ કરતાં વધારે મહેનતનું છે. અમેરીકન ભલામણ મુજબ તો તેમણે લગભગ ૧૦૦ ગ્રામ પ્રોટીન રોજનું લેવું જોઇએ. સ્નાયુના બાંધા માટે તે અગત્યનું છે. આ કોલેજોમાં ૫૬–૬૬ ગ્રામ પ્રોટીન રોજ મળે છે. તે ઓછું કહેવાય. આથી યે વધુ મોટી ખામી તો પ્રાણીજ પ્રોટીનની છે. ફકત ૬ થી૧૦ ગ્રામ જેટલું જ રોજના મળે છે. પ્રાણીજ પ્રોટીન વગર બીજા પ્રોટીનનો ઉપયોગ શરીર સારી રીતે કરી શકતું નથી. તેમને પ્રાણીજ પ્રોટીન ઓછામાં ઓછું રોજનું ૨૦ ગ્રામ જેટલું મળવું જોઇએ. લગભગ ૧। શેર દૂધ કે દૂધની બનાવટમાંથી કે ૪ ઇંડામાંથી એ મળી રહે.

અન્નાહારી વિદ્યાર્થીઓ તેલ ચરબી જરા વધારે લે છે. આ રસોડામાં બધે વેજીટેબલ ઘી વપરાયું છે. આમાંથી વિટામિન અ કેટલું મળે તે કહેવું મુશ્કેલ છે.

અમેરિકન ભલામણ મુજબ તેમને રોજના ૧.૪ ગ્રામ કેલ્શીઅમની જરૂર છે. તેને બદલે ૦.૬૫ થી ૦.૯ ગ્રામ કેલ્શીઅમ મળે તે ઓછું કહેવાય. વધારે દૂધ લેવાય તો આ ખામી દૂર થાય.

બીજી મોટી ખામી વિટામિન અ ની છે. ૬૦૦૦ યુનીટને બદલે ૮૫૯ થી ૨૦૨૮ યુનિટજ મળે છે. વૃદ્ધિ તથા શક્તિ માટે, રોગનો વિરોધ કરવા માટે, આંખોનાં તેજ માટે અ જરૂરી છે. લગભગ બધા મેડિકલ વિદ્યાર્થીઓને કોલેજમાં ચશ્માં કઢાવવાં પડે છે. પૂરતું વિટામીન અ ઘણે અંશે તેમની આંખોની નબળાઇ ટાળી શકે. વિટામિન બ૧ પણ જોઇએ તેથી કુ લેવાય છે. સ્ફુર્તિ, કામ કરવાની ધગશ બ૧ ના અભાવે ઓછી રહે છે. વારંવાર મોં આવી જાય અને મોંમાં ચાંદી પડે છે તે આને લીધે હોઇ શકે. વિટામિન 'સી' પૂરતું મુંબઇના વિદ્યાર્થીઓ લે છે. પણ રાંધવામાં સોડાનો છુટથી વપરાશ થતો હોવાથી તેમને ખરેખર કેટલું વિટામિન આખરે મળે છે તે કહેવું મુશ્કેલ છે.

ખોરાક શારીરિક તેમજ માનસિક વિકાસનો પાયો છે. ગૂજરાતી વિદ્યાર્થીઓનો આ પાયો પાંગળો છે. તેમના ખોરાકમાં પ્રાણીજ પ્રોટીન, કેલ્શીઅમ અને કેટલાક વિટામિનોની ઉણપ છે. તેનું કારણ પૂરતા દૂધ અને શુદ્ધ ઘીની અછત તથા રાંધવાની કેટલીક રીતો છે– દા.ત. ચોખાનું ઓસામણ ફેંકી દેવાની પ્રથા, સોડાનો છુટથી ઉપયોગ, વધુ પડતા ફરસાણો ને તળેલી ચીજો ખાવાનો શોખ– ગણાવાય. અન્નાહાર જો પૂરતા દૂધ, શુદ્ધ ઘી અને તાજા શાકભાજી વિનાનો હોય તો બહુ ખામીભર્યો ખોરાક છે. ઉગતી પ્રજા માટે સારો ખોરાક એ સૌથી અગત્યનો વિષય છે.

આધાર

૧ આરોગ્ય અને ખોરાક ગુ. સંશોધન મંડળ ૧૯૪૧.

૨ ન્યુટ્રિશન રિસર્ચ કૌન્સિલ, વોશીંગ્ટન, પત્રિકા નં. ૧૨૨ (ઓગસ્ટ ૧૯૪૫)

૩ ઇન્ડિયન મેડિકલ ગેઝેટ (પાઠક. જે. ઠી.) જાન્યુ. ૧૯૪૭ પા. ૩૫.

૪ ,, ,, ,, ,, ફેબ્રુ. ૧૯૪૮ પા. ૬૮.

REVIEWS

THE BULLETIN OF THE BUREAU OF ECONOMICS AND STATISTICS (OCT. 1947) contains an interesting study of the public health of Bombay Province for the period 1935 to 1945.

This is first time that a critical Study of the vital statistics is conducted by properly trained statisticians. This new way of representation of vital statistics spread over a monograph of 31 pages would repay the detailed study. But the following conclusions are worth noting :

(1) The enteric fever is increasing throughout the province specially in Gujarat, Bombay City and Suburban Districts.

(2) Diseases of the circulatory system have shown increasing strength since 1936 ; the districts showing the very considerable increase are Ahmedabad, Kaira, Broach and Panchmahals, East Khandesh, Nasik, Belgaum and Bombay Suburban Districts.

(3) Abnormal Labour :—Districts of Ahmedabad, Kaira, West Khandesh, Ahmednagar, Poona and Kanara, show a substantial increase.

(4) Surat records a surprising reduction in the hospital facilities. The number of patients treated in the hospitals of Surat in 1940 was 3 lakhs, but this figure was reduced to 171,000 in 1945. On the other hand all diseases directly attributed to the scarcity of wholesome foodstuffs are increased in this district which seem to be one of the most seriously affected districts of the province.

The Indian Journal of Social Work for March 1948 contains an informative article by Dr. Kumarappa, Director of Tata Institute of Social Sciences, Bombay, on *Medical Social Work*. The Tatas with their pioneering instinct have made provision for training such medical social workers at the Tata Institute of Social Sciences, Bombay. It has become difficult for the physician to secure a complete understanding of the patient's social, economic and environmental history, and they are seldom discovered by physical examination and laboratory methods. The medical social worker, who is now being trained as the above institute, is expected to function most effectively when she works in continuous association with the physician as a member of the medical team. It is hoped that our major hospitals will soon establish such social service departments which will enhance the effectiveness of medical treatment and provide also the " follow up " treatment at the home. Such trained workers would be also useful for the family health centres advocated by the Gujarat Resarch Society.

ACKNOWLEDGMENTS

The Indian Journal of Medical Research for January, 1947 contains the summary of an important piece of research on the " Biological Value of the Proteins of Rice, Pulse and Milk, fed in different proportions to human beings, by M. Mitra and S. K. Varma. The biological value of the proteins of mixtures of rice and pulse and fed in different proportions varied between 54 and 64 : the corresponding values when milk was substituted for pulses, varied between 60 and 71.

Bulletin of Bureau of Economics & Statistics, Government of Bombay, Vol. I, No. 3 January 1948.

Philosophical Transactions of the Royal Asiatic Society of London, Vol. 233, No. 596 and Vol. 240, No. 820.

Journal of Industrial and Scientific Research, Vol. VII, Nos. 6, 7 & 8—1948.

Science and Culture, Vol. 14, Nos. 2, 7, 3.

Bulletin of the Baroda State Museum & Picture Gallery, Vol. III, Pt. II, 1946, Ed. by H. Goetz.

Journal of the Indian Merchants Chamber, Vol. XLI, Nos. 6 & 7.

સાંજ વર્તમાન પતેતી અંક-૧૯૪૮, પાનાં ૨૪૮, કિંમત રૂા. ત્રણ.

દર વર્ષની જેમ આ વર્ષે પણ સાંજ વર્તમાનનો ખાસ પતેતી અંક પતેતીના તહેવારોમાં પ્રસિદ્ધ થયો છે. આ અંકમાં લેખો અંગ્રેજી અને ગુજરાતી એમ બન્ને ભાષામાં છે. અંગ્રેજીમાં વૈજ્ઞાનિક પરિભાષા ઉપરનો દીવાન બહાદુર કૃષ્ણલાલભાઇ ઝવેરીનો લેખ મનનીય છે. (આ સંબંધી અમારા મંડળના ઉપપ્રમુખ શ્રી. પોપટલાલ શાહની કલમથી "ન્યુ ડેમોક્રેટ" અને "હરિજન"માં અનુક્રમે તા. ૨૦-૮-૧૯૪૮ અને ૨૯-૮-૪૮ ના અંકમાં વિગતવાર લેખો લખાયા છે.) આ મંડળ પણ ગુજરાતીમાં આવો એક શબ્દસંગ્રહ તૈયાર કરી રહ્યું છે. આ શબ્દસંગ્રહ "H" સુધી તૈયાર થયો છે અને થોડા વખતમાં પ્રેસમાં જશે. બીજા પણ મહા ગુજરાતના જાણીતા લેખકોની કૃતિઓથી આ અંક ભરપૂર છે. શ્રી. કનુ દેસાઇ અને શ્રી. રસિકલાલ પરીખના ચિત્રોથી અંકનું સુશોભન વધી ગયું છે. ભિન્ન ભિન્ન પ્રકારના વાંચકોની રસવૃત્તિને સંતોષે એવી વાનગીથી સભર આ અંક વાંચવા જેવો છે.

બુદ્ધિ પ્રકાશ-એપ્રિલ-જુન ૧૯૪૮. **નૂતન શિક્ષણ**-સળંગ અંક ૧૫૭, ઑગસ્ટ ૧૯૪૮. **પૂર્ણા**-પુસ્તક ૨, અંક ૧૧-૧૨ અને પુસ્તક-૩, અંક-૧. **પુસ્તકાલય**-પુસ્તક-૨૮, અંક ૧૧, ૧૨. **પ્રજાબંધુ, ભારતી, હરિજન, જય ગુજરાત**-નિયમિત.

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JOURNAL

OF THE

Gujarat Research Society

Vol. X OCTOBER, 1948 No. 4

EDITORIAL NOTE

We have great pleasure in presenting one more Special Number devoted to scholarly studies in the ancient history and culture of Maha Gujarat. The Gujarat Research Society is fortunate in having secured through the indefatigable efforts of its energetic Vice-President, Shri. Popatlal G. Shah and the willing co-operation of its members a large number of articles on a variety of topics falling under the above category. Considerations of economy in space and costs of publication unfortunately preclude us from incorporating all of them in this number. We, therefore, sincerely apologise to those scholars whose contributions have not appeared herein and assure them that each of the deserving ones will be accommodated as space permits.

Although the Society strives for the encouragement of research in all branches of knowledge, ancient history and culture has always received its special attention. This was reflected in the celebrations of the centenary of the late Dr. Bhagwanlal Indraji's birth date in 1939, and the pioneering of the first Gujarati Pre-historic Expedition in the Sabarmati Valley under one of its foundation members, Dr. H. D. Sankalia, with the help of the late Rao Bahadur K. N. Dixit, Director General of Archæology in India, and the Baroda State. On the completion of the first decade of its existence it also convened at the Convocation Hall of the Bombay University the First Maha Gujarat Research Conference. A large number of research scholars working in Bombay, Ahmedabad, Baroda, Surat, Rajkot, Bhavnagar, etc., took part in it enthusiastically and made valuable contributions to the discussions on a variety of subjects. A number of important resolutions for the development of research studies by this Society in collaboration with other similar institutions such as the Forbes Gujarati Sabha, Gujarat Vernacular Society and the Bhartiya Vidya Bhavan were passed and committees for implementing them were appointed. The proceedings of that Conference forming part of the Tenth Anniversary Celebrations of the Society were published in the joint number of its Journal for October 1946 and January 1947. The second Maha Gujarat Research Conference is expected to be held early in 1949.

A bulk of the Journal consists of articles contributed by the members about their own research activities for which they do not expect to be paid beyond the research grants given for meeting a portion of the expenditure incurred in doing field work. The Society awards a Research Medal for the most valuable research article appearing in the Journal of the Society. The first medal was awarded to

Dr. T. N. Dave of Ahmedabad in appreciation of his researches on the Linguistic Survey of the Borderlands of Gujarat. The second award was made to Dr. Chamanlal Mehta for his article on "Health of Gujarati Children at Birth" and the third to Mr. A. V. Pandya for his research work on the Narmada Valley Pre-historic Finds. Another impotant research work conducted under the auspices of the Society is the Anthropological Survey of Maha Gujarat by Dr. D. N. Majumdar of Lucknow University, some of the results of which have already been published in the Journal.

The Society has also the nucleus of a fund for encouraging archæological excavations and the study of the relics found. Out of this fund was organised the field-work in the Sabarmati Valley by Dr. Sankalia of the Deccan College Post-Graduate Research Institute. The work in the Narmada Valley is entrusted to Mr. A. V. Pandya.

This further contribution of the Society to the study of History and Culture contains articles from numerous scholars who pursue the subjects of their choice for the mere love of it, some of whom have begun to take interest in the work of the Society very recently. The article of Prof. Dar on the contribution to the culture of Gujarat during the rule of the Sultans is interesting.

The question of the language of the Journal has been one which has been often discussed. The Society has left it to the contributors to decide whether to compose their literary products in English or Gujarati. Some prefer English because of long-continued past habit and its capacity to appeal to a wider interprovincial and international public. Others make it a point specially to write on serious subjects such as the one to which this number has been devoted with a view to enrich their mother tongue and educate the non-English knowing public of Maha Gujarat taking interest in such subjects. It is open to any one to write his paper even in Hindustani or Hindi.

The Editorial Board hopes that more and more scholars devoting their selfless labours to the cause of research studies will evince an abiding interest in the work of the Society and offer their valuable contributions for publication in its Journal.

P. C. DIVANJI,
Chairman,
Sub-Committee on Ancient History & Culture.

CAMATKĀRAPUR AND THE KINGS OF PRE-HISTORIC ĀNARTA

By

P. C. DIVANJI

I. Introductory remarks; II. Nāgarakhaṇḍa as edited in Bombay; III. Camatkārapur and its environs; IV. Historical data contained in their description; V. Concluding remarks and probable date of the Nāgarakhaṇḍa.

I. Introductory remarks

The author of Part I of Volume I of the [1]*Bombay Gazetteer* entitled *History of Gujarat* has stated[1] that Ānarta was one of the three ancient sub-divisions of Gujarat and taken note of a popular legend that the town of Vaḍanagar in North Gujarat had been given the name of Camatkārapur in the Satyayuga, Ānartapur in the Tretā and, Ānandapur in the Dvāpara and that Vaḍanagar was a corrupt form of the name Vṛddhanagar given to it in the Kali. As to that legend, he opined, relying upon a Junagadh edition of the *Nāgarakhaṇḍa* of the *Skandapurāṇa* that Camatkārapur was a fabulous name and that the most ancient name of the said town must be "Ānarttapur" which was found mentioned at several places in the said edition of the *Nāgarakhaṇḍa*. It seems to me that the said author must not have come across a manuscript of the version of the said Khaṇḍa which was printed by the Vyankateśwar Press of Bombay in Saṁvat 1966 (A.D. 1910). If he had seen it, he would have been able to come to the conclusion that the most ancient name of the principal town with which the Nāgaras were connected was Camatkārapur. It may be that the name, which literally means "the City of Miracles" may have been given to it because miracles were known to occur there from time to time. Still at any rate the said name must have been believed from a time prior to the composition of the said version of the Khaṇḍa to have been derived from a King of the Solar race of that name, the tradition about whose name may have been lost. The said author would also have gathered that whereas the said name had been mentioned several times in connection with the places of pilgrimage described in the Khaṇḍa, the names of *"Ānartapur"* and *"Vṛddhanagar"* had never been mentioned, that each of the names *"Ānandapur"* and *"Nagara"* not preceded by any qualifying adjective, had been mentioned but once only and that the other alternate name which occurred very often was "Hāṭakeśvara-Kṣetra," because this Khaṇḍa had for its object the description of the region as a celebrated place of pilgrimage. The said author does not also seem to have gathered from the Junagadh edition of the Khāṇḍa any historical data as to the province of Ānarta (North Gujarat) of any age prior to that in which the Yādavas settled down in Surāṣṭra. The object of this paper is to present in a digested form the geographical and historical data existing in that edition of the said Khaṇḍa. Before I proceed to set

1. Bombay Gazetteer, Vol. I, Pt I, p. 6.

them forth, however, it is necessary to give a fairly good idea of the contents of the version reproduced in the V.P. edition, Bombay in order to inspire confidence in its greater antiquity and superior reliability.

II. Nāgarakhaṇḍa as edited by the Vyankateśvara Press, Bombay

2. The *Nāgarakhaṇḍa* purporting to be the *Sixth Khaṇḍa* of the *Skandapurāṇa* as printed by the V.P. Bombay in Saṁ. 1966 (A.D. 1910) in the form of a Pothi, *i.e. to say*, in horizontal lines on both the sides of consequcutively numbered loose pieces of paper, contains in all 279 Adhyāyas (Chapters) numbered separately, though the whole of the Khaṇḍa is said, in the colophon to each Chapter to form part of a *Saṁhitā* containing 81,000 stanzas collectively named the *Skandapurana*. The total number of stanzas comprised in the said 279 Chapters comes to a few (59) less than 15,000. Although all the Chapters have been marked consecutively from 1 onwards, there is stanza 36 in Chapter 154 which deserves to be taken special notice of, because it seems to throw light on the extent of the probable original composition and that of the subsequent addition and the method of revision followed by the second editor. The stanza quoted in the footnote below[2] is to the effect that "so far has been reproduced the first Khanda of the Purāṇa x x x x as promulgated by the son of the *Kṛttikās i.e.* Skaṅda." This is not the last stanza in that Chapter but is followed by 7 more containing the Phalastuti only, the last one being the 43rd. The important inferences for which it furnishes textual data are :— (1) that the first 153 chapters of the Khaṇḍa and stanzas 1 to 35 of Chapter 154 contain a reproduction of the original contents of the 1st, not the 6th, Khaṇḍa of the original *Skandapurāṇa*, (2) that while making the reproduction, the redactor had substantially preserved the original form and contents thereof and (3) that he had while adding new matters contained in the subsequent chapters 155 to 279 elaborated some of the older illustrative stories which had been succinctly narrated in the previous group of Chapters.

3. Broadly speaking, this version can be called the *Nagarakhaṇḍa* in so far as it contains a reproduction of the old Khaṇḍa of the said Purāṇa in Chapters 1 to 154 and the *Nāgarakhaṇḍa* in so far as it contains the new matters introduced by Chapters 155, to 279, since they chiefly relate to the origin of the Nāgara community, of the special customs observed by them, of the privileged position enjoyed by them almost till the advent of the British power in parts of Gujarāt and Kāṭhiavāḍ, the ancestry of the outstanding personality who was helpful in securing that position, the means by which he was believed to have acquired the capacity to do so and so on. The terms "Nagara" and "Nāgarāḥ" occur in Chapter 114 of the first group, but there the latter has only a geographical significance as the inhabitants of "Nagara". As contrasted with it the said terms when used in the Chapters comprised in the second group have a purely social significance as denoting an individual or a com-

2. एतत्खण्डं पुराणस्य प्रथमं परिकीर्तितम्। कार्तिकेयप्रणीतस्य सर्वपापहरं शुभम् ॥ ३६ ॥

The number 81,000 of the stanzas is the same as given in Ch. 53 of the *Maisyapurana* as the number of stanzas contained in the *Skandapurana*. The two Puranas and the others mentioned with them must therefore have been enlarged to their present extent about the same time.

munity which had acquired a special importance both inside the town and outside it. Even so, the name Vṛaddhanagar is unknown to it. It must, therefore, have been given to it at a later date in order probably to distinguish it from another "Nagara" which may have been founded then and the Junagadh edition of the *Nāgarakhaṅḍa* must have been a later edition thereof revised and enlarged after such a change in the name of the town and after some of the distinctions now existing began to be drawn between the different sections of the Nāgaras. The only distinction known to the older group and even the later group of Chapters in the Bombay edition is that between the Bāhyas (latterly corrupted into Bāraḍas), who had first migrated to the southern bank of the Sarasvatī and subsequently to the region in which there is source of the Narmadā (Chs. 163-64) or the Bahirvāsas (Ch. 172), and the Ābhyantaras. Interesting as the several other details available in both the groups of chapters are from the geological, anthropological, social, religious, philosophical and other points of view such as the progress in civilisation which the inhabitants of Ānartadeśa had till then attained, I make use of only such of them for this paper as are of geographical and historical importance because the space at my disposal is a limited one.

III. Camatkārapur and its environs

4. The city of Camatkārapur is found to have been described in Chs. 7 to 9, 14-15 and 28 of this Khaṅḍa as having been built over the principal peak of a mountain named *Ratnaśṛṅga* which is said to have been one of the three children of the Himācala, the other two being Maināka and Nandīvardhana. It is said to have filled up a cavity (Gartā) through which the *Nāgas* used to come up for making raids on the surface of the earth and which had consequently acquired the name of *Nāgabila* or Nāgaraṅdhra. Below the said cavity there is said to have been a Liṅga of Śīva made of gold which Brahmā had set up after the immolation in fire of Satī, daughter of Dakṣa and shortly before the second marriage of Śaṅkara with Pārvatī daughter of Himācala. It had already been once filled with dust raised by the Saṁvartaka Vāyu but still people from the surface used to go to Pātāla for the Darśana and Ārādhanā of Śaṅkara and for bathing in a pool of water believed to have special efficacy in curing certain diseases such as leprosy. Their reputation had so much affected the minds of the said people that even high class men like the Brāhmaṇas and the Kṣtriyas had begun to neglect the performance of sacrifices for the propitiation of the elemental gods. This mountain did not exist when Viśvāmitra went with Triśaṅku (King Satyavrata of Ayodhya) to enable him to bathe in the Ganges water in that cavity (Chs. 7, 2 and 3). Nor was it in existence when Lomaśa visited the Hāṭakeśvara-Kṣetra during his previous life as a Śūdra. At that time the Kṣetra itself had been covered over with dust (Ch. 271). The same was the case when Ahalyā visited it in order to be freed from the sin of adultery with Indra Jayatsena (Chs. 207-08). Śaṅkha, brother of Likhita too had no difficulty in going to that water-basin when he went to the Kṣetra for the restoration of his hands which had been cut off for having committed the crime of theft in his brother's garden (Chs. 209-11). But the mountain was there and had a forest on it inhabited by the sages of 72 families observing the rules of conduct of the Vānaprasthāśrama when Camatkāra of the Solar dynasty and king of Ānarta bathed

in the water for being cured of leprosy on the advice of some of the said sages (Chs. 9-10).

5. The temple of Acaleśvara on the Acaleśvara hill forming part of the Aravali range had been built by this very king when he retired after his queen Damayanti petrified by the curse of the Brāhmaṇas of the 68 Gotras whose wives had accepted gifts from her, after he constructed the walled city of Camatkārapur and erected a temple over her petrified corpse and set up there the idol of Camatkārī Durgā and the Brāhmaṇas accepted the gifts of the houses built for them and of villages from whose income they were to maintain themselves and to worship the idol daily and on auspicious occasions in their lives. (Chs. 10 to 12 and 11-12). Whereas the Acaleśvara temple was at a high altitude and was most probably included in Śālvadeśa, the Liṅga of Hāṭakeśvara and the Śaṅkha Tīrtha near it were situated at the foot of that hill in the Nairṭa-digbhāga (south-western direction) from that hill and formed part of Ānartadeśa (Ch. 4). The hill of Ratnaśṛṅga and the city of Camatkārapur called Hāṭakeśvara-Kṣetra after its destruction, were so situated as to have been protected by Śrī Hāṭakeśvara from below and by Śrī Acaleśvara from above (Ch. 28). There must be an extensive plateau on the peak of Ratnaśṛṅga where the city had been built because it is said that it was Pañca krośas in both its length and width[3] (Chs. 16-17). It is said to have been enclosed in walls in which there were gates for ingress and egress and to have roads, open spaces, water ponds etc. inside it (Ch. 112). We have no means to know positively whether any other classes of people besides the Brāhmaṇas of the 68 Gotras and their families were or were not allowed to stay in the city when it was originally built. At any rate there is sufficient evidence of the hill and its neighbourhood having been studded all over with temples of Śiva and Śakti, Brahmā, Viṣṇu, Āditya, Soma etc., and tanks and houses etc. built not only by the original Brahman settlers but also by the Kings of Ānarta and several persons of diverse races named the Brāhmaṇas, Kṣatriyas, Nāgas, Vānaras and Rākṣasas who went there for a causal pilgrimage or for settling there for leading a peaceful life (Chs. 7, and 86 to 112). Although it had been built by the King of Ānarta whose name it bore, it was never his capital[4] for he had made a grant to the Brāhmaṇa settlers not only of the city but also of several villages for their maintenance and for the worship of the idols originally and subsequently set up by him and charged his sons and grandsons with the duty of maintaining their grants

3. A *Krosa* according to Apte's Dictionary is 1/4th of a *Yojama* and a Yojana is equal to 8 to 9 miles. Hence the city must be at least 10 miles in length and 10 in width and therefore its total area must be 100 sq. miles. It may be either in the form of a square or a circle having that area because the terms used in the original are Ayama-Vyasatah, and Vyasa means both width and circumference. A glance at the map of the Bombay Province shows that very likely it must have been of the shape of a triangle bounded at the apex on the North by the Acalesvara hill, on the east by the river Sarasvati, on the south by the sea (now the Run of Kutch) and on the West by the river Sabhramati. While determining the possibility or otherwise of a city of that size we should bear in mind that the area of Karachi as planned is to be 600 sq. miles and that of Greater Bombay 274 sq. miles.

4. This inference is supported by the facts appearing from other Chapters, namely 125 (Praptipur said to be the capital of Brhadbala) and 123 (Vardhamanapur said to be the capital of Supriya, patron of Sakalya. In Ch. 199 it is said that V.P. was in existence in the time of Bharatiyajna in whose time there occurred the case of a Candala of that place having married the daughter of a Brahman of C. P. named Subhadra. In Ch. 271 it is said that Kampilya nagar was the name of a town in Anartadesa where a king named Prthvijaya had been ruling when one Indradyumna was hurled down from heaven.

(Chs. 111-12). Similar grants to Brāhmaṇas chiefly for continuing the worship of idols set up by them are recorded in this Khaṇḍa as having been made by Kings Satyasaṁdha (Ch. 125), Vasusena, Satyasena and Siddhasena—(Chs. 141 and 211) and an Indra who is said to have persuaded the Brāhmaṇas of 8 Gotras who had migrated to Kurukṣetra to go back to Hātakeśwara-Kṣetra and must therefore be a human king who had assumed that divine name for some reasons. The names of the villages said to have been granted have not been mentioned in any of these cases. However, the said Indra is said to have offered to the Brāhmaṇas of the 8 Kulas, after he had set up a Liṅga near a place known as Bālamaṇḍana (the place where Diti was believed to have given birth to the Bālas who were the Maruts) a "fine walled village-property situated in Maṅkula." The Brāhmaṇas are said to have accepted this Dakṣinā, not the Vritti of 12 villages which too Indra offered to them in order to provide for the continuance of the worship of the Liṅga set up by him. However, after much persuasion "a Madhyaga (an intermediary) named Devaśarmā who had become known by 3 Pravaras is said to have agreed to continue to worship the Liṅga if Indra promised by way of a boon the birth of a son who would be long-lived and virtuous, and Indra is said to have conferred the boon on him. Lastly, in Chapter 213 there is a long story of Sāṁba, son of Kṛṣṇa having gone from Dvārakā to Mt. Arbuda for propitiating Puṣkarāditya, of his having set up a fresh idol of Sāmbāditya named after himself and given a grant of 5 villages to the priests there for continuing the worship of that idol.

6, Out of the numerous temples, tanks and hermitages constructed within the limits of the city there are some which can be easily identified to-day, as though renovated they still continue to be visited by Hindu pilgrims, while there are others which cannot be identified without a close research because the region in question has numerous temples built by the Jainas, *e.g.* those at Delvāḍā and Acalgaḍh and it is very likely that they stand on the sites of the old temples of the Hindu gods and goddesses built in ancient times and that the idols of some of the gods and goddesses still to be seen there may be those which may have existed prior to the erection of the Jain temples. At least as regards the goddess Aṁbā (most probably Revatī-Aṁbā) having been required to be propitiated by Vimalsha there is already a tradition on record. However, even if they are left out of consideration there are so many of the above class that there can be little difficulty in choosing a few of them for particular mention here as keeping up old traditions although the structures now standing there may be of the age of the Parmars. Thus for instance, in the temple of Aṁbikā the special privileges of the Nāgar Brahmans which are mentioned in Chapters 168 to 173 of this Khaṇḍa are still respected. The large one-stone tank behind that temple is very likely the tank spoken of in Chapter 40 as having been excavated out of the one stone-slab, 52 cubits in length, which had fallen within the limits of Camatkārapur shortly before the beginning of the Kaliyuga. At a short distance from it there is the hill of Gabbar on which there is a foot-print of a goddess. This may very well be the foot-print of Sāvitrī, the offended wife of the so-called Brahmā in human form who had married an Ābhīra girl, performed a five-day sacrifice and mixed up a family of Nāgas with the indigenous population of Camatkārapur. The account of that sacrifice and the incidents connected with it occupy

Chapters 181 to 193 of this work. There can also be very little doubt as to the sites of the Dudhbāvḍī, the temple of Arbudā or Addhar Devī, and the hermitages of Vasiṣṭha and Gautama in a cavity of the Arbuda mountain being the specific spots described in Chapters 168, 172 and 207-08. The temple of Acaleśvara and the tank near it may similarly be mediaeval structures but there can be no doubt about their standing on the same hill on which King Camatkāra had erected a temple of Acaleśvara and on which the sage Mṛkaṇḍa had erected a temple of Brahmā near his hermitage where Mārkaṇḍeya met Viśvāmitra and Satyavrata-Triśaṅku (Chs. 4, 12 and 21). The town of Vidiśā (Vaidisaṁ Nagaraṁ) where there was a Math of Nimbaśuca, a Māheśvara Yati, (Ch. 274) where Śāṇḍilya is said to have been reborn (Ch. 271) and which was the capital of Dasārṇa in the times of Citravarmā and Bṛhatsena mentioned in the Maṇibhadra-Puṣpa episode (Chs. 155-61)[5] has already been identified with Besnagar near Bhilsa in Malva[5].

7. As distinguished from the above a diligent search must be made before we can locate the sites of the temples of Camatkārī Durgā, and Aṁbā and Vṛddhā erected by King Camatkāra before retirement (Chs. 64, 88, 111-13), that of the temple of Hāṭakeśvara where Citraśarmā, a Brāhmaṇa of the Vatsa Gotra had set up the Liṅga of gold which gave to Camatkārapur the name of Hāṭakeśvara-kṣetra according to Chapter 107 and which is said in Chapter 154 to have a special sanctity and which was most probably identical with the Citreśvara Pīṭha mentioned in the same Chapter, and the idol in the Citreśvara temple referred to in Chapter 271 in the account of the previous births of the Gṛdhra (vulture), who was a Markaṭaka (monkey) living in Camatkārapur, in his previous birth, those of the sun-god referred to in Chapters 45, 60, 76, 155-58, 161, 189, 209-11 and 213, that of the Ajapāleśvarī Devī along with an Ajāgṛha (a temple where all the 108 diseases known to the works on Āyurveda had been kept under subjection) built by this Ajapāla, father of Daśaratha of Ayodhya (Chs. 95 and 133), the temple Śakra (Indra) which Daśaratha and one of his queens are said to have been visiting often (Chs. 95-97), those of Śiva and Durgā said to have been set up by Rāma, Laxmaṇa and Sītā during their return journey from Lankā (Chs. 100-103) and the site of the Caturmukha or Caturvaktra Liṅgas said to have been set up by some of the Rākṣasas who accompanied Vibhīṣaṇa when he came along with Rāma during his said journey and got buried by Kuṣa (Chs. 103-104) and on seeing which excavated Bṛhadaśva of Śālvadeśa and a mason are said to have died (Ch. 105), the temple of the two Kumārikās (life-long spinsters) who were the two daughters of a Śūdra King of Ānarta, named Ratnāvalī and Brāhmaṇī, the daughter of a Brāhmaṇa, who were so much attached to each other as not have married, since marriages would have separated them (Chs. 194-98), that of Nara-Nārāyaṇa or Cakrapāṇi set up by Arjuna (Ch. 152), that of Viṣṇu with a Rājavāpi constructed by Daśaratha (Ch. 98), that of Śeṣaśāyī Nārāyaṇa inside a big lake to the north of the place where Maṅkaṇaka, a Brahman who by virtue of his knowledge of the Sarpavidyā could render poisonous snakes harmless, and founded the City of Ānandapur and set up the Liṅga of Ānandeśvara on the site of the city of Camatkārapur after it had been reduced to ashes (Chs. 40-41), the Vāstupada established by Kātyāyana, where subsequently Bhartṛyajña resided (Chs. 132 and 197), the temple of Mahā-

5. Nando Lal Dey's Geographical Dictionary of Ancient and Mediaeval India, p. 104.

Gaṇapati got constructed by Vararuci (Ch. 131), that of Kātyāyanī or Mahiṣāsuramardinī said to have been built by a former king and repaired by Revā, wife of Balarāma-Vāsudeva and daughter of Revata of Surāṣṭra, who again had married Kṣemaṅkarī, daughter of King Prabhañjana of Ānarta (Chs. 71 and 118 to 120) and the sites of Vardhamānapur, the capital of Ānarta in the times of Supriya and the Senas (Chs. 129, 174-75) and of Prāptipur on the river Sābhramatī, the capital of that province in the time of Bṛhadbala and Aṭṭa, the last two kings of the Solar race who are known to have ruled over it (Chs. 45 and 125-26)[6]. The numbers of temples, tanks, and hermitages whose names occur in the work are too many to be mentioned here exhaustively. That can be done only in an index for which I have already gathered materials. The above are, however, the names of those spots included in or connected with Camatkārapur, which one can hope to identify with the help of certain historical data, which their names, the accounts of their origin and certain other facts mentioned in this Khaṇḍa furnish.

IV. Historical Data contained in their description

8. It will have been noticed from the names of places mentioned in the preceding section that the names of several well-known kings and learned Brāhmaṇas of antiquity have been associated with them. There are also several others which have not been mentioned. Out of those of the Brāhmaṇas, those of Yājñavalkya and Śākalya are associated with that of Supriya of Vardhamānpur and that of Bhartṛyajña with that of Aśvasena, also of the same place. Yājñavalkya's ancestry is again traced in Ch. 278 from Sunaḥśepa, who is well-known as the son of Ajigarta, whom Viśvāmitra had released from the noose of Varuṇa and adopted as his eldest son by the name of Devarāta. And that of Bhaṭṭṛyajña is traced in the same Chapter from the said Yājñavalkya said to be a son of Cārāyaṇa. He is most probably the same Cārāyaṇa who is cited as an authority in the *Kāmasūtra* of Vātsyāyana[7]. It can also be ascertained from the comparative list of the ruling Kṣatriyas and Brāhmaṇas given by Pargiter[8] that Yājñavalkya and Śākalya had been living in the time of Adhisomakṛṣṇa of the Paurava line, who was the great-grandson of Parikṣit, the grandson of Arjuna Pāṇḍava[9].

9. The names of the kings of Ānarta found in this Khaṇḍa can, therefore, be tentatively classified and arranged as follows:—

(*a*) *Kṣatriya Kings of the Solar dynasty*:—

(1). *Camatkāra*, who founded Camatkārapur, set up the idol of Camatkārī Durgā and built a temple as big as Kailāsa[11] on the site where the corpses of his daughter Ambā and Vṛddhā were buried or burnt (Chs. 4, 12, 21,

6. The names of none of these two towns is found in the Geography of Ancient India by Cunningham as revised and re-edited by Majumdar Sastri in 1924 or in Nandalal Dey's Geography of Ancient and Mediaeval India. Evidently, however, they must have been situated within the triangular region defined in foot-note 3 above.

7. K. S. I. 1.12 : 4-20 ; 5.22 ; This Yajnavalkya is obviously different from Yajnavalkya Vajasaneya. There is enough eternal evidence to show that: I cannot enter into its details here for want of space but will do so in the proposed Index.

8. A. I. H. T. pp 330-31.

9. Matsyapurana Ch. 50.

28 and 88). His identity remains an enigma and therefore his position in in the Ayodhya line cannot be ascertained. However, he must not have preceded Satyavrata-Triśaṅku, for when the latter visited Hāṭakeśvara with Viśvāmitra there were only that Liṅga and the Gartā at a very lower level from that of Ācaleśvara (Ch. 4). He is said to have made land and village grants.

(2). *Satyasaṁdha*, who is dramatically dropped down from heaven during the reign of Bṛhadbala, made to live the life of a recluse in Camatkārapur and to see the son of Bṛhadbala installed on the throne at Prāptipur. He is spoken of as having made grants in his life of a recluse with the permission of Bṛhadbala (Chs. 125-26). This name is not found in the list of Pargiter but in the Rāmāyaṇa, it is said to be another name of Rāma[10]. There is, however, no clue to identify this Satyasaṁdha with Rāma Dāśarathī, because the former is said to be the ancestor of 77th degree of Bṛhadbala. Nor is there any to identify his son Suhāya, with Kuśa or Lava. On the other hand, there is some similarity of this name with Saṁhatāśva, the 17th king of the Ayodhya line in Pargiter's list which makes him the 77th in ascent from Bṛhadbala.

(3). *Suhāya*, the son and successor of the said Satyasaṁdha (Ch. 125), who is said in Ch. 65 to have erected the temple of Ānartakśvara.

(4). *Bṛhadbala*, a contemporary of Arjuna and Kṛṣṇa[11]. Between him and Satyasaṁdha there was a wide gap of several centuries as he says (Ch. 125) that he had heard that he was the 77th in descent from the latter. There is no wonder that Satyasaṁdha notices that not only had the capital of Ānarta been shifted to Praptipur but many physical changes had also taken place there during the interval. He had his capital at Prāptipur on a bank of the R. Sābhramatī.

(5). *Aṭṭa*, a son of Bṛhadbala by Niyoga is said to have been installed as the king of Ānarta after Bṛhadbala was killed in a battle. His mother is said to be a daughter of a king of Daśārna (Ch. 128). There is no such name in Pargiter's list but very probably it is another name of Bṛhatkṣaya, who is shown in that list to have succeeded to the throne immediately after Bṛhadbala.

(*b*) *Śūdra Kings of the Sena dynasty* :—

(1). *Jayatsena*. This is given in Ch. 207 as the name of an Indra of the Bṛhatkalpa. But I have reasons to believe that the Indra, in whose story contained in Chs. 204-206, that of Jayatsena-Indra has been mentioned,

10. When Ravana after having kidnapped Sita proposes to her to accept the position of his queen, she says :—राजा दशरथो नाम धर्मसेतुरिवाचलः । सत्यसंधः परिज्ञातो यस्य पुत्रःस राघवः ॥ रामो नाम स धर्मात्मा त्रिषु लोकेषु विश्रुतः । दीर्घबाहुर्विशालाक्षो दैवतं स पतिर्मम ॥ इक्ष्वाकूणां कुले जातः सिंहस्कन्धो महाद्युतिः । लक्ष्मणेन सह भ्रात्रा यस्तेप्राणान्वधिष्यति ॥ अ. का. ५६. २—४ ॥

11. Pargiter. A. I. H. T. pp: 166-67.

was a human king of that very name because it was he who had brought an Ābhīra girl for being married to the so-called "Brahmā of another age" who had come to found a second Puṣkara-tīrtha, performed a five-day sacrifice, admitted a family of the Nāgas and certain Rākṣasas in the population of Camatkārapur and arranged for their sources of livelihood, given a place to the Yoginīs amongst the caste-gods of the Nāgaras on appeasing them, got his own idol also set up by them and when the Brāhmaṇas opposed the admission of the Batu, a Nāga, had acknowledged him as his grand-son (Chs. 179-93).

(2-3). *Vasusena* and his son *Satyasena*, whose names occur in Ch. 141. The latter is said to have distributed much grain and water during a 12-year famine which occurred in Ānarta during his reign. His father too is said to have been very charitable.

(4). *Siddhasena*, who had been affected by leprosy and had lost his kingdom owing to an attack on it by some one, was most probably a son of Satyasena. He is said to have fled to Mount Raivataka, but to have returned to Camatkārapur later on and revived the grants of lands which his father and grand-father had made to Nāgara Brāhmaṇas but which he had once repudiated (Ch. 209).

(5). *Aśvasena*, a contemporary of Bhartṛyajña who knew from him the past cultural history of the Nāgaras occupying Chs. 215 to 269.

I call these Senas Śūdras because, a daughter of the last named Ratnāvalī, is called a Śūdrā as opposed to a friend of hers, a Brāhmaṇī. Both of them were much attached to each other, lived together, remained unmarried and practised penance at the Vāstupada, where Bhartṛyajña lived. The memory of both was preserved by the erection of a temple of the two Kumārikās. The capital of the Senas was Vardhamānapur (Chs. 194-98).

(*c*) *Kings of unknown dynasties* :—

Besides the above, there are three other kings of Ānarta whose names occur in this work but it is not stated to which dynasties they belonged. They are :—

(1). *Prabhañjana*, the father-in-law of Revata, a Nāga king of Surāṣṭra, whose daughter Revatī was married to Balabhadra, the elder brother of Kṛṣṇa, after the Yādavas migrated to Surāṣṭra. This Revatī is said to have built at Camatkārapur a temple of Revatī-Ambā or repaired an old one of Mahiṣāsuramardinī or Kātyāyanī and given that goddess a new name. It is said that it was in the time of Prabhañjana that Nāgas had invaded the kingdom of Ānarta and that the city of Camatkārapur was re-named "Nagara" after one Brāhmaṇa named Prabhāva brought about a reconciliation between the Brāhmaṇas and the Nāgas (Chs. 114-18).

(2). *Supriya*, the patron of Śākalya, with whom Yājñavalkya had a quarrel. He too had his capital at Vardhamānapur (Chs. 129 and 278).

(3). *Prithvījaya.* His name occurs in Ch. 278 wherein the author tries to show that civilised life existed in India for 56 Kalpas, by dramatically dropping down from heaven a king of the name of Indradyumna who had lived so many Kalpas ago and had performed several sacrifices and about whom consequently those who had lived for only 7, 14, 28, 35 and 42 Kalpas did not know anything. He is dropped in the town of Kāmpilya in Ānartadeśa. This means that there was once a town of that name in the said province. It cannot be the Kāmpilya which according to Cunningham was the capital of South Pāñcāla and stood on the site of the present Kampil in the Farukabad district of the United Provinces.[12] In the list of kings of South Pāñcāla, there is one Pṛthu occupying the 80th position amongst the descendants of Manu Vaivasvata[13]. But there is nothing in the context in which the name of Pṛthivījaya occurs in the text or in any other part thereof which would justify his identification with the said Pṛthu.

All the above kings being considered together with a view to their being assigned to any of the four ages, Pre-Vedic, Early Vedic, Later Vedic and Epic, mentioned in my paper on "Pre-historic Aryan Settlements on the Soil of Gujarat[14]", it appears that Camatkara, Satyasaṁdha and Suhāya would be falling in the Pre-Vedic age and Prabhañjana, Bṛhadbala and Aṭṭa alias Bṛhatkṣaya in the Epic age. A fifth age would have to be added to the said four in order to assign a position to Supriya and the Senas. As they are kings of the age following the Kuru-Pāṇḍu war, I call it the Post-Epic age. No position need be assigned to Prthivījaya.

11. It is clear from the above that there was a very wide gap between Suhāya and Bṛhadbala. Although the specific designation "King of Ānarta", has not been used with reference to those kings of the Solar dynasty subsequent to Suhāya who visited Camatkārapur, it is not without significance that the names of Triśaṅku (Satyavrata), Hariścandra and Rohitāśva (32nd, 33rd and 34th in the Ayodhya line, Aṁbarīṣa, Saudāsa, Dilīpa, Aja, Daśaratha, Rāma, Kuśa and Nala (48th, 54th 60th, 63rd, 65th, 66-67th and 70th in the same line) do occur there as the kings who had visited the places and had either performed some ceremonies or penances or built some temples or tanks there. Although the names of the kings of some other lines also do occur there, there is no line whose kings has such family connection with this region as these Ayodhya Kings had. Not only that, Aja is even said to have built an Ajāgṛha where the 108 diseases known to the Āyurveda were kept under check (Chs. 95 and 133) and Kuśa is said to have taken Vibhīṣaṇa of Laṅkā to task for not restraining his Rākṣasas from molesting the people of this place after coming on the pretext of worshipping the four-mouthed Liṅgas set up by them, and to have got the said Lingas buried by Vibhīṣaṇa (Chs. 104-05). This shows that even in the age in which the Kings of Ayodhya had not been ruling directly over Ānarta, they had at least been exercising some sort of sovereign authority over it.

12. Nando Lal Dey's Geographical Dictionary of Ancient and Medieval India, p. 33.
13. Pargiter, A. I. H. T. pp. 144-43.
14. Journal, Gujarat Research Society, Vol. VIII (1946) pp. 74-81.

V. *Concluding Remarks and Probable Date of the Nāgarakhaṇḍa*

12, To sum up, Camatkārapur was the name of a city in existence in the Pre-Vedic, Early Vedic and Later Vedic ages and in a part of the Epic age. Though perhaps small in the beginning, it had subsequently grown into one of extensive dimensions after the Liṅga of gold of God Hāṭakeśvara was installed by a Brāhmaṇa of the Vatsa Gotra living in that city. A natural catastrophe, most probably in the shape of a volcanic eruption, had befallen it in the latter part of the Epic age and it was consequently covered over with white ashes. The site on which it stood had also undergone many physical changes.[15] Subsequently another town of the name of Ānandapur with a temple of God Ānandeśvara was built upon it. Prior to its such destruction it had been attacked by the Nāgas coming from the Nether Region where the old Hāṭakeśvara Liṅga set up by a Brahmā of the age intervening between the death of Sati, daughter of Dakṣa-Prajāpati and wife of Śaṅkara and the second marriage of the latter with Gaurī or Pārvatī, daughter of Himācala. Those Nāgas belonged to 8 Kulas (families). A ninth was added to it when the Brahmā of a later age, who was the god reduced to a human form, prevailed upon the Brāhmaṇas of the city to allow the Baṭu, son of Sanātana and acknowledged by the said Brahmā to be his grandson who had been cursed to be a Nāga, to settle down there. (Ch. 183). It was after the first incursion of the Nāgas that one Trijāta (eunuch) named Prabhāva, the son of Nimi Datta of the Sāṁkṛtyāyana Gotra who had been ex-communicated, brought about a compromise between the Brāhmaṇas and the Nāgas by prevailing upon the former to shed the fear that the Nāgas being like poisonous snakes were not fit to be associated with and to return to the city, that the name "Nagara", was given to it and that its inhabitants began to be called "Nāgaras" (Ch. 114). Still the name thereof known to the inhabitants of the other places was Hāṭakeśvara-Kṣetra. There is nothing in this version of the Khaṇḍa to connect the city with Vaḍanagar.

13. There are some data in the Nāgarakhaṇḍa itself from which it is possible to fix the probable date of its composition. On a comparison of the contents of the two groups of chapters mentioned in Section II above it appears that the reputation of Hāṭakeśvara-Kṣetra had become greatly enhanced during the interval between the composition of the 1st Khaṇḍa of the original *Skaṇḍapuraṇa*, which, chapters 1 to 154 of this work reproduce substantially and without adulteration and that of the 6th Khaṇḍa of the said *Purāṇa*, at which time it came to contain approximately 81,000 stanzas. It also appears that such enhancement was due to the performance of a five-day sacrifice by a so-called Brahmā and a Śrāddha rite by a so-called Indra (Chs. 179-93, 204-07) and the conferment of special privileges on the Brāhmaṇas of the place called the Nāgaras of the 8 Kulas brought from Kuru-kṣetra (Ch. 204-07) and that no other natural catastrophe nor any foreign incursion had occurred in the meanwhile.

15. The author describing the imaginary experience which Satyasamdha had on seeing the region over which he ruled 77 generations ago says:—यावत्पश्यति तावत्स स्थलस्थाने जलाशयान् । जलस्थानेषु संजाताः स्थलसंघाः सुदुर्गमाः ॥ अन्ये लोकास्तथा धर्मास्तेषां मध्ये व्यवस्थिताः । पृच्छन्नपि न जानाति सम्बन्धं केनचित्सह ॥ १२५. ३९—४०॥

14. The language of the work is very simple and there are some grammatical irregularities therein which the editor has noted in the foot-notes. The prosody is also very simple just like that of the *Bhagavadgīta*, which has no stanza composed in a Vṛtta having more than 12 syllables. Out of nearly 60 kings whose names occur in the work, there is none out of those who can be identified, who is of a date later than 300 years after the date of Bhārata War (1500 B. C. approximately), the last one being Suṣeṇa who is found from the *Matsyapurāṇa*[16] to belong to the 12th generation from Arjuna in the Paurava line. In the course of the description of the Śrāddha-vidhi by Sūta as narrated by Bhartṛyajña, there occurs a mention of 12 kinds of sons, namely Aurasa, Pratipanna, Krīta, Patita, Śiṣya, Dattajīva and Aśvattha in the group of those who enable one to swim across hell, and Kṣetraja, Sahoḍhaja, Kānīna, Kuṇḍa and Golaka in that of those who do not (Ch. 223). A comparison of this with the corresponding verses in the *Smṛti of Yājñavalkya*[17] makes it clear that they do not agree either in the kinds, the order of enumeration or their spiritual evaluation and that Bhartṛyajña's list and evaluation are decidedly anterior, the term "Dattajīva" seeming to me to have reference to the story of Suṇaḥśepa whom Bhartṛyajña claimed as his earliest known ancestor (Ch. 278), there being no sons of the "Śiṣya" Aśvattha, Kuṇḍa and Golaka classes in the Smṛti, the term "Pratipanna" having been used for the "Apaviddha" of the Smṛti and the "Ksetraja" and Kānīna having been assigned very lower position than in the Smṛti. A comparison thereof with the corresponding portion of the Nārada recension of the *Manu Smṛti*[18] and the *Gautama Dharmasūtra* (the oldest Sūtra yet known)[19] also shows that the Kṣetraja and Dattaka had acquired honourable positions in the order even in the time of Gautama, though they had not in the time of Bhartṛyajña and that sons like "Śiṣya" and "Aśvattha" were not recognised by the earliest Sūtrakāra. In Chapter 242, the four Varṇas and the 18 Prakṛtis (lower castes than the Śūdras) are mentioned but when the list of the latter is compared with that of the mixed castes given in the *Manu Smṛti*[20] it is found that those sprung from several mixed marriages or illegitimate intercourse mentioned in the latter are not included in the list given in this Khaṇḍa. In fact, the instances of the so-called Brahmā, who performed the five-day sacrifice, on taking an Ābhīra girl to wife on purifying her (Ch. 181) and of the so-called Indra permitting the family of Vāta or Vātaka, a Brāhmaṇa of the Upamanyu Gotra, who had accepted a gift of Indra's Pāpapiṇḍa (Ch. 269) to bring Brāhmaṇa girls from outside the city and conferring a blessing that inspite of that the members of that family would continue to be fit for social intercourse in the City,[21] go to show that in this part of Bhāratavarṣa at least there must have been very little mixture of castes when Bhartṛyajña framed the rules of the Nāgara caste. The references to other non-Aryan races,

16. Matsyapurana Ch. 50 read with Pargiter, A. I. H. T. pp. 144-49.
17. Vyavaharadhyaya 128-32.
18. Dayabhaga (Ch. 9) 158-65.
19. Chapter XXVIII. 32-33. (S. B. E. Vol. 2 pp. 303-04.)
20. Ch. X. 6-56.
21. स्थानवाह्यद्विजातीनां कुले दारपरिग्रहम् । कृत्वा त्वद्गोत्रसंभूता ब्राह्मणा मत्प्रसादतः ।। व्यवहार्या भविष्यन्ति नगरे सर्वकर्मसु ॥ २६९. १४३-४४।१ ।

Abhīras, Pulinḍas, Śabaras, Meḍakas and others in Chapters 66-69, 113-14, 116, 126, 135, 165, 167, 209, 213-14 and 266 also go to show that the later tribes of the Gujjars and Huṇas were unknown to the author of this work and that it was only as the result of the intervention of the men of outstanding personalities that foreign tribes were allowed even to stay in this region. Lastly, there is no reference in this work to the doctrines developed out of the teachings of Gautama Buddha. The word "Bauddha" does occur in Chapter 184-85, but it has been used in the sense of a descendant of Buddha, one of the four Brāhmaṇas who had first migrated to Kurukṣetra.

15. There is however one event whose mention in Chapter 263 makes one pause to think before assigning a very early date to this version of the *Nāgarakhaṇḍa* and that is the birth of Matsyanātha from a fish in the ocean of milk in the presence of Śīva and Pārvatī while the former was imparting knowledge of Brahman and of the way of its realisation called Jnāna-yoga. The numerous legends, pedigrees, etc., collected by G. W. Briggs, the author of *Gorakhnath and the Kanphāṭa Yogis* from the oral traditions current in the Punjab, Nepal, N. W. F. Province, United Provinces, Western India and from several printed works go to show[22] that the date of Matsyanātha cannot be ascertained except on the assumption of there being only one Matsyanātha and that person being the Guru of Gorakhnātha. On that basis his date would fall between the 9th and 12th centuries of the Christian era[23]. Even so, there can be no doubt as to the contents of Chapters 1 to 154 of this version of the Khaṇḍa having been based upon some very old materials available to the author and as to their containing statements of bare facts as gathered therefrom. And that being so, there are, in my opinion, sufficient reliable data for undertaking an archeological survey and for excavating trial pits in the region above-outlined. It appears to me that the party headed by Dr. Sankalia had concentrated its attention too much towards the east of the said region and at a very lower altitude than that on which the ruins of the temples, tanks and hermitages described in this Khaṇḍa could have been found.

22. See Ch. XI, pp. 228-50.

23. A later date, 11th to 12th century, would also have to be assigned to this work and even to the original Skandapurana on which Chs. 1 to 154 are based, if any one can establish that the Senas of Anarta belonged to a branch of the Sena family of Karnata which had settled down in Bengal about the middle of the 11th century and founded a Kingdom there in the time of Vijaya Sena, son of the original settlor Samanta Sena (History of India by Sinha and Banerjee, Calcutta, 1947).

CULTURAL AND LITERARY ACTIVITIES UNDER THE SULTANS OF GUJARAT

By

Prof. M. I. DAR

In the vast sub-continent of India the province of Gujarat has always enjoyed the reputation of being one of the great-centres of interest for its glorious achievements in the domain of religion, culture and commerce. Its contact with early Islam dates back to the second decade of the first century of Islamic era. Long before the Arab invasion of Sind it attracted the attention of the Arab warriors who under the able guidance of Hakam bin Abil 'As set their foot in 15 A. H. (636 A.) on the coast of Gujarat. Thana, the Arabicized form of which is Tana, was the first to bear the brunt of the Muslim attack. Hakam led another naval expedition against Broach, the famous Barwas of the Arab historians. Though these enterprises were attended with some success we do not hear of any further expedition in the reign of the Caliph 'Umar who discouraged naval activities in distant waters. When Uthman bin Ab'il As, the Governor of Bahrayn wrote to Umar informing him of this expedition. Umar expressed his displeasure in the following words, "O brother (member) of the Thaqif (name of an Arab tribe), thou hast put a worm on the wood. By Allah I swear that if they had been smitten, I would exact from thy tribe thy equivalent."

In the reign of the third pious Caliph Uthman 'Abdullah bin Amir, the Governor of Iraq, sent Hakam bin Jabala al-Abdi to secure information about Hind for the Caliph. When asked by the Caliph to describe it, he answered, "The water supply is scanty ; the dates are inferior ; and the robbers are bold. A small army would be lost there and a large army would starve." Uthman said to him, "Are you giving me information or reciting poetry." He replied, "Nay, information." Notwithstanding this kind of warning and discouragement expeditions against India continued till in 93 A. H. (711-712 A.D.) the young and capable general Muhammad bin Qasim conquered Sind and extended his sway to Multan and Qanauj.

From Junayd, the Arab Governor of Sind, down to Muizz ad-Din Muhammad Sam generally known in Indian history as Shihab ad-Din Ghuri and his slave Qutb ad-Din Aybak, no doubt the Muslims made several inroads into Gujarat but did not leave any lasting impression. It was Ala ad-Din Khalji, the great conqueror and legislator who sent his general Ulugh Khan in 696 A. H. (1296-97 A.D.) with large equipments for the conquest of Gujarat. Ulugh Khan defeated Raja Karan and fixed Nahrwala Patan as the seat of Government. The princess Deval Devi wa captured and sent to the imperial capital where she was married to Ala ad-Din's son Khidr Khan. This happy union which had a tragic end has been immortalised by

Amir Khusrau, the greatest Persian poet of India, in the pages of his romantic Mathnawi poem Ashiqā or Ishqiyya.

After its conquest by Ala ad-Din's forces, Gujarat, like other provinces, was ruled by a number of Governors who from time to time carried on the work of administration on behalf of their masters. One such Governor was Zafar Khan who had governed Gujarat for about sixteen years with remarkable efficiency as a deputy of the Tughlaqs. The central government of Delhi which became very weak as a result of Timur's invasion of India in 801 A. H. (1398 A.D.) could not keep under control the provincial satraps who threw off their allegiance to the central authority and proclaimed themselves as independent rulers. Zafar Khan also proclaimed himself independent, ascended the throne with the title of Muzaffar Shah in 810 A.H. (1407 A.D.) and founded a dynasty which produced illustrious rulers and conquerors.

The history of the independent Sultans of Gujarat forms a very interesting chapter in the history of India. This dynasty ruled over the kingdom of Gujarat with its ever-extending frontiers for a period of about one hundred and eighty years but their great achievements as conquerors, administrators, builders, bibliophiles and patrons of arts and letters gave them a place of honour and distinction amongst the Indian rulers and spread their fame in Hijaz, Yaman and other Muslim countries. They were also fortunate in as much as their glorious deeds were recorded by a number of historians. Of the large number of works which were written to commemorate their achievements only a few have escaped the ravages of time. These historical works may be divided into two classes. Firstly there are the chronicles of some monarchs by the contemporary writers whose main concern was to deal with the events of their patrons' reign. It may be pointed out with great regret that almost all these have been lost with the exception of Tarikh-i-Mahmud Shahi described by Rieu in his catalogue of the British Museum. Another manuscript of the same work is to be found in a private library in Peshawar. Through the courtesy and kindness of Khwaja Sakhaullah, Professor of Arabic in the Islamiya College, Peshawar, it has been possible for me to read the list of its contents which reveals the encyclopaedic nature of this work. It is a general history of the world and only about eighty pages have been devoted to the history of India. It was composed by one Fayd Allah Binbani in the year 907 (1501-2 A.D.) at Bidar where he had been sent as an ambassador by Mahmud Begda. The author belonged to a very learned family and he himself compiled a number of works. Besides the Tarikh-i-Mahmud Shahi, there is a contemporry account of Muzaffar II's campaign against Malwa for liberating Mahmud Khalji from the hegemony of Medni Rae and his supporters. There is a manuscript of this work in the Aparao Bholanath Library at Ahmedabad. It was transcribed by Sarabhai Mehta at Ahmedabad in the year 1222 A.H. corresponding to 1803 Hindi Samvant in the regime of Chimnaji Rao Gaekawar. From the Madin-al Insha, a collection of Sara Mehta's Persian letters in two volumes and his Tarikh-i-

Marhata dar Gujarat (History of Mahrattas in Gujarat) it is clear that he possessed a fair knowledge of Persian in which he could express himself with perfect case. Tarikh-i-Muzaffar Shahi, as the account of Muzaffar II's campaign is called—one does not know why—has been edited by Sayyid Abu Zafar Nadvi with a fairly exhaustive summary in Gujarati and by Dr. M. Abdullah Chaghtai with summaries in English and Urdu.

It is a matter for regret that most of these historical works have been lost though all of these were extant till the time when the last Mughal Diwan of Gujarat wrote his famous Mir'at-i-Ahmadi in 1174 A.H. (1760-61 A.D.). The second class of works deal with the general history of the dynasty from the period of Muzaffar I to the conquest of Gujarat by Akbar in 980 A.H.(1572-73 A.D.). Of these the most famous are the Mir'at-i-Sikandari, Mirat-i-Ahmadi and the Arabic history of Gujarat by Hajji Dabir. As the author of the Mir'at-i-Sikandari himself tells us he was the first to undertake to write a comprehensive history which should include all the rulers of this dynasty. As this work was compiled after the Sultanate had been supplanted by the Mughals, therefore, to a great extent it is free from partiality or prejudice. The author claims to have utilised all the available material within his reach and has brought his account down to 1101 A. H. (1592-93 A.D.) when the last Sultan Muzaffar after a long and chequered career committed suicide with a razor. Only recently my learned friend Dr. M. A. Chaghtai has written an article on the sources of the Mir'at-i-Sikandari in which he points out that some of the sources mentioned in the printed editions cannot be traced in the earliest manuscripts though these are to be found in later manuscripts. It is generally believed and the belief is based on a statement of the author of the Mir'at-i-Ahmadi that the Mir'at-i-Sikandari was written forty years after the fall of the Gujarat Sultanate, that is in 1020 A. H. but my study of the contents of this book leads me to the conclusion that it must have been written in the life-time of Akbar, that is, before 1014 A. H. (1605-6 A.D.). As far as the Sultans of Gujarat are concerned, the author of the Mir'at-i-Ahmadi has contented himself with a summary of the Mir'at-i-Sikandari but the chief value of his useful work lies in the history of this province under the Mughal emperors and later on under the Mahratta chiefs quarrelling with one another for supremacy. Some of the very important farmans issued for the whole of India by Aurangzib have been preserved in the pages of the Mir'at-i-Ahmadi. Besides, it gives a detailed account of the geography of Gujarat, its people, its eminent men and saints with a wealth of detail which enables the readers to form a fairly good estimate of Gujarat and various things pertaining to it. Abu Turab Wali's Tarikh-i-Gujarat edited by Sir Denison Ross begins with an account of Humayun's conquest of Gujarat. As Abu Turab played an important part on behalf of I'timad Khan—the man responsible for inviting Akbar to annex Gujarat to his kingdom, his work throws light on the intrigues rampant among the nobles of Gujarat which ultimately brought about the destruction of all of them.

It was in 1906 that Sir Denison Ross discovered the Arabic History of Gujarat in the library of the Madrasa-i-Aliya at Calcutta and was so much fascinated by it that he persuaded the Government of India to bear the expenses of its publication. From 1910 to 1928 he published the Arabic text in three volumes along with fairly exhaustive indices. It is a pity that its introductory portion dealing with the reign of Muzaffar I and Ahmad Shah is Missing. The book is divided into two volumes (daftars), the first containing the historical account of the Sultans of Gujarat and the second dealing with the general history of Muslim rule in India from Muizzad-Din Ghuri down to the accession of Akbar. No doubt the second daftar is, to a great exent, a reproduction of the historical works like the Tabaqat-i-Nasiri Tarikh-i-Firuz Shahi by Barni and Akbar Nama by Abdul Fadl and other works but still it has a value of its own in as much as its author Hajji Dabir writes as an independent and impartial historian. Moreover, he supplements Barni and others with accounts from the Tabaqat-i-Husam Khani which is identical with Tarikh-i-Bahadur Shahi, written by Husam Khan, the grandson of Muhafiz Khan whose magnificent mosque at Ahmedabad stands as a monument to his fine taste. The second volume is no doubt important but it is the first volume which is of immense value to a student of Indian history for it throws ample light upon some of the hitherto unknown aspects of the history of Gujarat. If one were to cast a cursory glance over the Index prepared by Sir Denison Ross one would be in a position to appreciate the wide range of topics discussed by Hajji Dabir. It is a valuable authority on the history of the Gujarat Sultanate. It complements and corrects the Mir'at-i-Sikandari in numerous cases. The Abyssinians had risen to great prominence in Gujarat in the 15th and 16th centuries. It seems that the Indian chroniclers on account of their prejudices did not do justice to these foreigners but Hajji Dabir who had very intimate relations with some of these Habashi nobles is full of praise for them. He has selected a few of them for special treatment and described their contribution to culture and learning. His first patron Muhammad Ulugh Hhan had taken a leading part in the quarrels which had continued uninterruptedly among the nobles during the last twenty years of the Sultanate. Therefore Hajji Dabris' account of this internecine strife is based on first hand information. Similarly his account of the Habashis in the Deccan and Khandesh is very graphic. Of all the historians of Gujarat it was only Hajji Dabir who devoted special attention to the Portuguese menace to the Muslim countries, especially to the famous ports of—Gujarat and Arabia. It is in the pages of his charming history that we find an account of the fleets of Turkey and Gujarat making combined efforts to drive away the Portuguese from the Muslim ports. Bahadur Shah's death was followed by the Portuguese capturing the port of Div. Mahmud III who ascended the throne after Bahadur Shah made a gigantic effort to dislodge the Portuguese but failed. The tragic story of this failure is given by Hajji Dabir while the author of the Mir'at-i-Sikandari does not make even the slightest reference to it. This charming history is also useful for a proper appreciation of the cultural contribution of Gujarat under the independent Sultans, for

in its pages we can find an account of the education and training of young men, the course of studies and the patronage extended to learning and a description of scholars who came to India from Yemen and Persia. It is a matter of great regret that this book has not so far received the attention it deserves from the students of Indian history and the only reason for it is that this charming work is not accessible to the general readers in its translation. Sir Denison Ross was very anxious to undertake the work of translation but unfortunately his desire remained unfulfilled. We conclude our account of Hajji Dabir with the following appreciation from the pen of Sir Denison Ross :—"After enjoying for over a quarter of a century the society of Hajji Dabir, I have grown to like him more and more ; and I feel towards him a very real affection".

Adverting to works written in modern times, one has to turn to the pages of the monumental work of Professor M. S. Commissariat which, in the words of Sir Derison Ross, "will remain, for a long time to come, the last word on the subject". The architectural monuments of Gujarat have received the attention of Burgess and others who have dwelt on the subject at great length but the cultural and literary contribution of Gujarat under the Sultans still awaits the patient and sustained labours of students and scholars. The late Hakim Abdul Hayy of Lucknow has prepared the ground for further researches in this direction by writing his Yad-i-Ayyam which should serve as a basis and guide for those who wish to pursue this subject.

Of all the provinces of India Gujarat is endowed with peculiarities which distinguish it from the rest. In the beginning of the second volume of Zafar-ul-Walih Hajji Dabir writes, with reference to Zafar, the first independent ruler, and his descendants, "Gujarat has some special characteristics which India in spite of its vastness cannot afford to claim. In whatever direction you cast a glance you will behold in plenty three things which drive away all grief, that is, water, verdure and beautiful faces . . . . . Under Muzaffar and his successors its territory became extensive and it prospered and flourished both in respect of cities and inhabitants." In view of the richness of the province of Gujarat, Sikandar, the famous Lodi King of Delhi, used to say : "The kingdom of Delhi has to depend for its revenue on wheat and maize while the kingdom of Gujarat depends upon pearls and corals because the king of Gujarat has eighty four ports under his control." Hakim Abdul Hayy who had made a very deep study of the history of Muslim India—and it is a pity that some of his important works on this subject have not yet seen the light of publication, is emphatically of the opinion that Delhi during the six centuries of Muslim rule cannot claim that amount of patronage which the Sultans of Gujarat extended to arts and learning during their rule lasting for about a century and a half."

The Sultans of Gujarat established peace and order throughout their dominions. They conquered territories, founded cities, built castles, caravanserais, tanks and step-wells. They opened schools and patronised scholars and men of letters. They

promoted music and other arts. Agriculture was encouraged to such an extent that once the inhabitants of a place complained to Muzaffar II that there was left no place untilled for their cattle to graze. Mahmud Begda's love of gardening knew no bounds. Different kinds of plants and fruits were imported from various countries. Mahmud was ever ready to help a person who could care to plant a tree. He founded Muhammadabad at Champaner, Mustafabad at Junagadh and Mahmudabad near Ahmedabad and adorned these with lofty buildings and beautiful gardens but still these cities could not excel Ahmedabad which was declared by Amin Ahmad Razi, the author of Haft Iqtlim, to be finest city in the whole world. These Sultans had a very high sense of Justice. According to Muslim law a culprit guilty of murder is pardoned in case the relatives of a murdered person agree to accept blood-wit but Ahmad Shah I refused to grant this concession in the case of his son-in-law on the ground that such a concession might have an adverse effect upon the powerful, and well-to-do persons who can afford to pay a heavy penalty in the form of blood-money. In the reign of Mahmud Begda in 870 A. H. (1465-66 A.D.) two powerful nobles Imadul-Mulk Hajji and Aḍud-al-Mulk Kalu in order to protect the real offender Baha-al-Mulk, the son of Ala-al-Mulk Ulugh Khan Suhrab, induced two innocent persons to plead guilty and they were hanged for the murder which they had never committed. After some time when the true facts of the case were brought to the notice of the Sultan he ordered the two nobles to be hanged for this heinous act. Muzaffar II displayed his high sense of justice and repect for law when in response to the summons of the Qadi at Champaner he attended the court like an ordinary persom while the judge remained seated. The suit was decided against the Sultan who complimented the judge on his impartiality and sense of justice.

The fame of the Sultans of Gujarat as generous patrons of learning had reached all the Muslim lands and consequently attracted a large number of savants and scholars from different parts of the Islamic world. Learned men from Yemen, Hijaz, Egypt and Persia adorned their courts, dedicated their books to them and received liberal presents. Hulwi of Shiraz whose account of Ahmed Shah I's reign in Persian verse has unfortunately been lost, speaks of many madrasas in the city of Ahmedabad in the reign of Ahmed Shah. One such Madrasa was at Sarkhej where the great Saint Shaykh Ahmed Khattu lies buried. The Shaikh who was deeply versed in the intellectual and traditional sciences of his time dedicated his Risalat al-Ahmadiyya concerning the spiritual chiefs of the Maghribi order to Sultan Ahmad Shah. This treatise with its Arabic commentary is preserved in the library of Pir Muhammad Shah at Ahmedahad. An Egyptian savant Badr ad Din Damamini was drawn towards Gujarat by the liberal patronage of Ahmad Shah. Ibn al-Jazari, one of the great scholars, from Shiraz, deputed. Najib Shafii to present his al-Hisn al-Hasin to the founder of Ahmedabad. Later on in the reign of Mahmud Begda this work was translated into Persian by Abu Bakr of Broach. Mahmud I who ruled over Gujarat for more than half a century evinced a keen interest in the

Persian translation of Arabic works. It was in his reign that the famous Biographical Dictionary of Ibn Khallikan was translated into Persian by Yusuf ibn Ahmad under the title of Manzar al Insan and dedicated to Begda in the year 889 A.H. (1484-85 A.D.) when he conquered Champaner. Similarly Ibn 'Iyad's Kitab ash—Shifa was rendered into Persian by Ibn Afrash who has in the course of his Persian translation mentioned certain incidents which are a clear indication of the keen intelligence of Begada in religious matters notwithstanding the fact that the king had not studied the religious or intellectual sciences in the regular manner. Besides several foreign scholars like Bahraq and Ibn Suwayd who visited Gujarat and were warmly received by Begada we find some distinguished scholars of Gujarat who adorned the court of this illustrious ruler. One of these scholars was Faydallah Binbani who dedicated his Majma-an-Nawadir to Mahmud. This work reminds one of the well-known Chahar Maqala of Nizami Arudi, the real title of which is Majma-an-Nawadir. The subject matter is the same, the only difference being that Chahr Maqala is divided into four chapters while Fayd Allah's book consists of forty chapters. In the introduction of his Majma-un-Nawadir which is a dissertation on the Muslim polity, Fayd Allah remarks in a spirit of pride and self-complacency that this greatgrand-father Sadr ad-Din compiled a commentary on the Quran entitled Bahr-al-Maani and several other works in Arabic. Similarly Minhaj, the brother of his grand-father, popularised the science of Tradition by writing commentaries on the most famous collections of traditions Sahih-al-Bukhari and Muslim. About eighty books were compiled by Minhaj. It is interesting to note that most of these works were written at the instance of the Sultans of Gujarat. Fayd Allah mentions some other works written by himself like Dastur-al-Huffaz and Khulasat-al-Hikayat. In the same reign we find another work Uyun-ash-Shar' compiled by one Ni'mat Allah. Mahmud Begada was a great builder. We have it on the authority of the Mir'at-i-Sikandari that Mahmud had constructed lofty and grand caravanserais and inns for the comfort of travellers and built paradise—like mosques and madrasas. He had placed his own library under the control of Sayyid Uthman, known as Shami-Burhani in the building of the latter's madrasas at Uthmanpur, a suburb of Ahmedabad. Mahmud Begada had ushered in a reign of prosperity, happiness and all-round development. Describing the marvellous progress made by Gujarat under the benevolent rule of Begda, the author of the Mir'at-i-Sikandari compares Gujarat in respect of perfection to a perfect man and maintains that the people of Gujarat developed sound understanding and judiciousness of mind in matters of elegance and culture in the reign of this glorious king.

Muzaffar II was known for his piety, clemency and selflessness. He was well-versed in religious sciences. We find him studying the Maalim-at-Tanzil by Baghawi, a well-known commentary on the Quran and taking part in discussions of religious and literary character. He had studied the science of tradition under Majd-ad-

Din-al- Iji who had been elevated by him to the position of a minister with the title of khudawand Khan. When Bahraq, a great scholar of Yaman, happened to visit Gujarat the king did not only welcome him but also learnt at his feet. His skill in the art of music had won him the admiration of the great musicians of his time. His selflessness found complete manifestation in his conquest of Mandu and his reinstating Mahmud Khalji on the throne of Malwa an achievement which in the words of Abu Turab Wali deserves to be written in letters of gold. Of the numerous commentaries written on Sahih-al-Bukhari the most celebrated is Fath-al-Bari compiled by Ibn Hajar Asqalani. When the first available copy of this commentary in Gujarat was presented to the king by Sayid Ali Khan Bara Nahar of Mandu Muzaffar showed his appreciation of this present by appointing the Sayyid governor of Broach. Muzaffar's munificence was not only confined to his subjects in Gujarat but was extended to the deserving people in Mecca and Medina. With a view to perpetuating his memory he constructed in the holy city of Mecca a hospice (Ribāt) consisting of a Madrasa and a sabil etc. A special endowment had been set apart and its annual proceeds were sent to Mecca for the maintenance of teachers and students. Muzaffar who had acquired a great proficiency in calligraphy presented to the cities of Mecca and Medina two copies of the Quran written in his own hand with gold water. For the maintenance of those who used these copies for the purposes of recitation and looked after these presents of Muzaffar a special annual grant had been allotted. Hajji Dabir who had witnessed this function in Mecca says that this practice continued till the death of Mahmud III who also followed the example set by his grandfather Muzaffar. He reserved the revenue of some villages near Cambay including the small part of Gandhar for Mecca and Medina. In Mecca he built a ribat (hospice) in Suq-al-Layl consisting of a madrasa, a sabil and a school for the orphans and another ribat in Bab-al-Umra and a sabil on the road to Jidda. In the year he was murdered he had sent one thousand sundhas of indigo for the construction of wells on the Medina road. Shaikh Ali Muttaqi, one of the great scholars and saints of India, whose blessings were sought even by Sulayman, the magnificent, of Turkey, visited Gujarat twice in the reign of Mahmud III who had built for the Shaykh and his disciples a mansion near his own hospice (Ribat) in the Suq-al-Layl of Mecca and allotted an annual sum for the maintenance of the Shaykh.

The ministers of these Sultans excelled their masters in respect of learning and patronage. Some of them were not only patrons of the learned but themselves occupied a distinguished position as scholars and poets. Khudawand Khan Majd-ad-Din Muhammad bin Muhammad al-Iji who became one of the viziers of Muzaffar II was also his teacher in the science of Tradition. In the reign of Bahadur Shah he continued in his position as a minister. On defeating Bahadur Humayun treated Khudawand Khan very kindly and secured the sanad (certificate) from him in Hadith of which the latter possessed a very wide knowledge.

Ikhtiyar Khan Siddiqi who rose to premiership under Bahadur and was elevated to the position of a regent under Mahmud III, belonged to a family of the Qaḍis of Nadiad. According to Hajji Dabir he attained to highest eminence in intellectual and religious sciences, Mathematics, Astronomy, poetry, Logic and Philosophy. "In respect of intelligence, sagacity and insight he was the second of Iyas bin Qurra. He was unequalled and combined in himself the chiefship in religious and temporal matters." When Humayun captured Champaner he received Ikhtiyar Khan with great kindness on account of the latter's erudition and learning and discussed with him several subjects pertaining to the domain of intellectual sciences and literature. As mentioned by Hajji Dabir, Humayun, on seeing Ikhtiyar Khan, would say what the illustrious Buyid prince Aḍud-ad-Daula used to say about the famous poet Muhammad bin Abdullah as Salami, "when I see him I feel as if the planet mercury (god of learning) has descended from the heaven and stood before me". In this connection it would be interesting to know that when Humayun was encamping near Cambay the Kolis and Bhils at the instigation of some Gujarati nobles made a raid on the Emperor's camp at night. The Emperor and his retinue escaped unscathed as they had received a timely warning but some of the very precious articles and books were lost. Among these was a copy of the Timur Nama by Hatifi which had been transcribed by one of the greatest calligraphists of all times Sultan Ali Mashhadi and which contained miniature paintings by the great artist Bihzad. In his Akbar Nama Abul Faḍl, however, mentions that this beautiful manuscript was recovered by Akbar and placed in the royal library. Another fine example of a scholar statesman was 'Abdal-Aziz Asaf Khan who eclipsed all other ministers and nobles. When Sultan Bahadur realised his weakness against Humayun he sent his harem and other valuable things to Mecca in the charge of Asaf Khan. During his stay there he created such a favourable impression that the great scholar Ibn Hajar-al-Haythami compiled a biographical account of Asaf Khan under the title of Riyaḍ ar-Riḍwan which has been reproduced in extenso with a running commentary by Hajji Dabir. This account gives us an inkling into the course of studies prevalent in Gujarat at that time. We are told that Asaf Khan commenced with the study of Grammar and Rhetoric under his father as these were current among the people of Gujarat and formed the chief basis for further studies. For religious sciences and particularly Hadith he sat at the feet of Qadi Burhan ad-Din of Patan. His teachers in Logic, Philosophy and medicine were Abul Fadl Gazaruni and Abul Fadl Astarabadi, the worthy pupils of Jalal-ud-Din Dawwani who is known to students of Persian as the author of Akhlaq-i-Jalali. It was in Ahmedabad that Shaykh Mubarak, the father of Abul Faḍl, had studied the works of Avicenna and other masters under Khatib Abul Faḍl Gazaruni who had left Shiraz and settled at Ahmedabad. Both by virtue of his position as the custodian of royal harem and treasures, and his eminence as a scholar and patron of the learned Asaf Khan enjoyed an unrivalled popularity among all classes of Mecca during his long stay there. Scholars and theologians discussed in his assembly matters relating to the exegesis of the Quran,

Tradition and jurisprudence and the Sufis sought his congenial company because they found him to be one of their own class. He so liberally and bountifully patronised the learned, encouraged the students and promoted education that the people began to compare him to the Bermecides. It is said that he spent every year 150 boxes of gold which enabled the people of Mecca to furnish gold ornaments for their women and servants and to lead a happy and comfortable life. In the year 955 A.H. (1548-49 A.D.) Mahmud III required the services of Asaf Khan as chief minister for suppressing the mutual rivalries of nobles and restoring peace and order. When Asaf Khan sailed for Gujarat unfortunately for him there was a storm in the sea which shattered his vessel. He himself safely landed at Manglore Patan but lost his collection of valuable books and a sword made of thunder-stone which he had received as a present from the ruler of Mecca. However his chief loss was an autograph copy of the Mishkat, a well-known collection of traditions which he valued the most and for which he had offered a price far in excess of that demanded by the bookseller himself. His name-sake 'Izz-ad-Din Abd-al-Aziz of Mecca wrote a long qasida in his honour and proved the sincerity of his affection and loyalty by lamenting Asaf Khan's death in an elegy marked by pathos and deep sentiment.

The patronage of arts and letters was not the sole prerogative of the kings and their ministers but was a common feature among the nobility of Gujarat. A mere glance at the pages of the charming history of Hajji Dabir will confirm this statement. The court of the Turjish noble Chingiz Khan was flocked by the learned men of Persia and Arabia. The Abyssinian nobles did not lag behind others in encouraging arts and letters. Shirwan Khan Habashi patronised two famous musicians Afif ad-Din and Ustad Ali. To the students of Indian architecture Sidi Said is known as the builder of a superb mosque in Ahmedabad with the most beautiful screens existing in the world but if we turn over the pages of Zafar-al-Walih and an Nur-as-Sāfir we meet with a scholar who had studied under Ibn Hajar of Mecca and other masters. He was such a great bibliophile that he built his own ship, sent it to Egypt and gave to the captain a list of the books which he required. As ill luck would have it the ship foundered near Cambay and many of the books were lost. Hamid, the son of Qadi Abdullah Sindi dedicated to Sidi Said his Jami-as-Saidi. Sandal Ghalib Khan who was like a brother to Hajji Dabir had been instructed by his master Jehangir Khan in all branches of literature. The Arab chiefs and the scholars of Yaman added lustre to his assembly. Bijlikhan was a great lover of music and musicians but perhaps it was under Darya Khan Husayn who at one time was in sole authority on behalf of Mahmud III that love for music had permeated all classes of people. The author of the Mir'at-i-Sikandari writes that his term of premiership augured so well that the chronogram Khush Hal (Happy) was suggested as signifying the beginning of his tenure and the general prosperity of the people. During his premiership the sound of musical instruments was heard

in all streets and lanes. Some great musicians like Nayak Gopal and Nayak Husayni entertained his assembly with their sweet music. Even before the independent sultanate was established, one of the governors of Gujarat on behalf of Firuz Tughlaq, named Abu Raja Ibrahim bin Hasan took a very keen interest in the encouragement of music. It was at his instance that Ghunyat-al-Munya based on Indian sources was compiled. Earlier an Arabic work on music Farid az-Zaman fi-Marifat-al-Alhan had also been translated into Persian at the instance of the same noble.

Foreign Scholars who visited Gujarat

Within the short space of this article it would not be possible for me to mention all the great scholars who were drawn towards Gujarat from time to time by the generosity of kings and nobles. I will just pick up a few of them and leave others for the present. Rabi bin Subayh or Sabih, a great traditionist and according to Hajji Khalifa, the earliest author of Islam, lies buried in Gujarat. The place of his death is Barbud which is considered to be a place in Sind but Hakim Abdul Hayy, though be could not identify this place, was of the opinion that Barbud must be somewhere near the bay of Cambay. We think that he was right in making this surmise. In the Arabic History of Gujarat (Vol. I, P. 286) we find the fort of Bharbhut near Broach on the bank of Narbuda attacked by the Portuguese in the reign of Mahmud III. We are inclined to believe that Bharbhut is identical with Barbud. If this conjecture be correct Gujarat will have the honour of attracting the first author in Islam who died in Gujarat in 160 A.H. Al-Damamini, a great man of letters and grammarian of Egypt came to Gujarat in the reign of Ahmad Shah to whom he dedicated his Ayn-al-Hayat, an abridgment of al-Damiri's book of animals, and Taliq-al-Fara'id, a commentary on Ibn Malik's Tahsil-al-Fawa'id, a well-known book on Arabic grammar. Similarly he compiled Tuhfat-al-Gharib, a commentary on Ibn Hisham's Mughnil Labib in 824 A.H. (1421 A.D.) when he was in Cambay. In view of the clear and emphatic statement made by al-Damamini in the preface to his al-Manhal-as-safi, a commentary on another grammatical work al-wafi, it is difficult for us to agree with Hajji Dabir when he accuses al-Damamini of transferring the dedication of this book from Ahmad Shah of Gujarat to Ahmad Shah Bahmani. Abal-Qasim bin Ahmad ash-Shafii, known like his ancestors as Ibn Fahd, prosecuted his studies at Cairo and Damascus. He travelled to India with a copy of the Fath-al-Bari written in the hand of his father and uncle and presented it to one of the kings there. After the death of Mahmud Begada he left Gujarat for Mandu where he died in 925 A.H. (1518-19 A.D.). The honoured title of Malik-al-Muhaddithin (Prince of Traditionists) was conferred by Mahmud Begada on a scholar from Egypt known as Ibn Suwayd who died at Ahmedabad in 929 A.H. Sakhawi in his Dau-al-Lami' (a biographical account of the notables of the ninth century of Islam) mentions Ibn Suwayd as having proceeded to Yaman and imparting instruction in the port of Zayla' and then starting for Cambay. Jar-allah Ibn Fahd who wrote a supplement

to Ḍau-al-Lami' furnished additional information concerning Ibn Suwayd for whom he prepared a collection of forty traditions entitled al-Fath-al-Mubin al-Hani. Ibn Suwayd enjoyed high esteem in the lifetime of Mahmud Begada and administered the Jizya department until he was divested of much of his glory in the reign of Muzaffar II. In 930 A.H. (1523-24 A.D.) a great grammarian and man of lettrs from Yaman named Jamal-ud-Din Muhammad bin Umar and known as Bahraq died. He was born at Hadramant (Yaman) in 869 A.H. (1464-65 A.D.). After receiving education from the learned men of that place he moved to Zabid where he took lessons in the science of Tradition and the principles of jurisprudence. Sufism soon attracted him and he was initiated into the sufistic mysteries by Sayyid Husayn al-Ahdal. At the age of twenty-five he performed a pilgrimage to Mecca and studied at the feet of Sakhawi. After visiting Aden and other places where he was kindly received he waited upon Sultan Muzaffar II who received him into his favour, made ample provisions for him and became one of his pupils. Bahraq wrote a large number of books. For Muzaffar II he compiled a biography of the Prophet. Of the good verses he composed in Arabic some have been reproduced by Hajji Dabir. Abdul M'uti bin Hasan al-Haḍrami who was born at Mecca in 905 A.H. (1499-1500 A.D.) read Sahih-al-Bukhari with Shaykh al-Islam Zakariyya Ansari. He died at Ahmedabad in 989 A.H. (1881-82) and was buried by the side of Sidi Said. Another pupil of the Shaykh-al-Islam was Shihab-ad-Din Ahmad al-Misri who dedicated several works to the Sultans of Gujarat. Imad ad-Din Muhammad bin Mahmmud al-Tārimi who originally belonged to Tarim, a town in Khurasan, came to Ahmedabad along with his books and had the honour of being the teacher of the two great scholars of Gujarat Shaykh Wajih-ad-Din al-Alawi and Qaḍi 'Isa. Tarimi died at Patan in 941 A.H. (1534-35 A.D.). We have already mentioned the names of Khatib Ab-al Fadl Gazaruni and Ab-al Fadl Astarabadi, the worthy pupils of Jalal-ad-Dawwani. Students from distant parts of India came to Ahmedabad to take lessons from them in philosophy. In his Ain-i-Akbari Abal Faḍl speaks of Khatib Gazaruni in glowing terms for it was under his paternal care that Shaykh Mubarak, the father of Abal Faḍl, had studied philosophical works in Ahmedabad. Ab al Faḍl particularly mentions at-Tajrid and Avicenna's works al-Ishārāt and al-Shifa as having been studied by his father.

Some great Scholars of Gujarat

The number of the Scholars of Gujarat is a legion. For the convenience of readers I will select only a few of them. The first name which deserves out attention is that of Makhdum Ali of Mahim. Generally the people of Bombay look upon the Makhdum as a great saint round whose tomb a large number of men and women gather together to pay their homage to the saint but few of them can appreciate the contribution of the Makhdum to theology and mysticism. Al-Mahaimi was a thorough-going Sufi pantheist and was particularly fond of Ibn Arabi's works. He compiled a commentary on Ibn Arabi's Fusus al-Hikam and on Suhrawardi's Awarif-al-Maarif. He was a voluminous writer. His commentary on the Quran betrays

his sufistic tendencies. In his In'am-al-Malik-al-Allam he has attempted to give a clear and convincing exposition of the Law. He died in 835 A.H. (1431-32 A.D.). Mufti Rukn ad-Din of Nagor, while he was at Nahrwala Patan compiled a compendium of Law entitled al-fatwa-al-Hammadiyya at the instance of Qaḍi Hammad ad-Din bin Qaḍi Akram. The compilers of Fatawa 'Alamgiri have frequently quoted al-fatawa al-Hammadiyya. Though originally not an inhabitant of Gujarat for the ancestors of Shaikh Ali Muttaqi belonged to Jaunpore and he himself was born at Burhanpur the intimate relations he had with the people of Gujarat have induced the authors of the Mir'at-i-Sikandari and Ahmadi to include the Shaykh among the saints and scholars of Gujarat. In his Akhbar al Akhyar Shaykh Abd al-Haqq of Delhi has sketched the career of Muttaqi as a saint and scholar. In the beginning he became the disciple of Abd al-Hakim, the son of Shah Bajan. At Multan he studied for two years Baidawi's commentary and Ayn al-Ilm under Shaykh Husam ad-Din Muttaqi. Later on he settled at Mecca where he came into contact with Abal Hasan al-Bakri and Ibn Hajar. As has already been mentioned, the Shaykh visited Gujarat twice in the reign of Mahmud III. About one hundred books and treatises were compiled by him. His most important work is Kanz al Ummal, a monumental collection of traditions. Suyuti, the famous encyclopaedic writer of Egypt, had collected a large number of traditions in an alphabetical order. Ali Muttaqi rearranged Suyuti's Jama' Jawami' in the form of Kanz al-Ummal for the benefit of the students of Fiqh. This work was held in such a high esteem that Ab al Hasan at Bakri remarked " Suyuti obliged the world by compiling al-Jama' and Ali Muttaqi obliged Suyuti by rearranging this work." His love for knowledge was so immense that he spent most of his time in imparting instruction. He used to supply the students with books and prepare ink for them. He died in 975 A.H (1567-68 A.D.) and was buried at Mecca. Of his disciples Shaykh Abd Allah and Rahmat Allah of Sind did much to encourage the study of Hadith in Gujarat.

In the science of Tradition however the Gujarati scholar who reached the highest pinnacle was Muhammad bin Tahir of Pattan who made a valuable contribution to the Hadith literature by compiling his Majma Bihar al-Anwar, a dictionary of Hadith and the Quran. Besides Majma' he compiled other works on subjects connected with Hadith. After completing his studies in Gujarat he proceeded to Mecca where he continued the study of Hadith under the great scholars of Mecca and became the disciple of Shaykh Ali Muttaqi whom he considered as the greatest man of his time. After his return from Mecca he concentrated all his efforts on introducing reforms among the Bohra community of Gujarat. Generally it is believed that the Bohras to whom Muhammad bin Tahir addressed himself were Ismailies but according to a statement made by the author of Gulzar-i-Abrar it seems that these Bohras were the followers of Sayyid Muhammad Mahdi of Jaunpore. However it is a fact that he died at the hands of these very persons whom he wanted to reform near Ujjain in 986 A.H. (1578-79 A.D.). Some of his descendants distinguished

themselves as Qadis at the Mughal court. One of his descendants Abd al-Qadir, the author of a collection of Fatawa in four volumes, was the Mufti of Mecca. Of the Indian scholars who made their mark in Arabia and elsewhere Mufti Qutb ad-Din of Pattan holds a very high position. He completed his studies at Mecca, Cairo and Constantinople. He was introduced to the Turkish Sultan Sulayman, the magnificent, by his minister Ilyas Pasha in 945 A.H. (1538-39 A.D.). The Sultan made him in charge of the four schools opened in Mecca of which he was also appointed a Mufti. He also opened a library in Madrasat al-Ashrafiyya. He is the author of two well-known historical works which have been widely appreciated in the Muslim countries. His al-'Ilam bi A'lam Bayt Allah al Haram is a detailed history of Mecca and Kaba while the second work al-Barq at-al-Yamani is a history of the conquest of Yaman. He died in 990 A.H. The most celebrated and greatest teacher of Gujarat was Shaykh Wajid ad-Din Alawi of Ahmedabad who continued to impart instruction in all the sciences, traditional and intellectual, to the seekers of knowledge for a long period extending over sixty years and whose pupils were to be found throughout India. He was held in high esteem by Sultan Mahmud III, Muzaffar, the last Sultan of Gujarat and the nobles of this prince. Khan-i-Azam Aziz Koka displeased the Shaykh by his behaviour but the Shaykh was treated kindly by Akbar. Abd ar-Rahim Khan -i-Khanan not only showed great respect for the Shaykh but even sat at his feet and read some books with him. Wajih-ad-Din was the disciple of Muhammad Ghauth of Gwalior. He compiled commentaries and glosses on a large number of works. He died at Ahmedabad in 998 A.H. (1589-90 A.D.). His tradition was continued by his descendants some of whom migrated to Burhanpur and Bijapur. Sayyid Husayni Pir of Ahmedabad, one of the descendants of Shaykh Wajih ad-Din, has written a comprehensive biography of this saint and scholar under the title of Tadhkirat al-Wajih which, we hope, will soon see the light of publication.

Well-known Sufi orders and their Representatives in Gujarat

Long before the conquest of Gujarat by Ala ad-Din Khalji Muslim settlers were to be found on the coast of Gujarat and even in the capital city of Nahrawala Pattan. Among these settlers who were treated kindly by the Hindu rulers of Gujarat we find some saintly persons who had settled in Gujarat for carrying on their missionary activities. After Gujarat became a province under the central Government there started a regular stream of Sufis into Gujarat. A Sufi is generally cosmopolitan in outlook and free from narrow sectarian bias. In no time these Sufis attracted a large number of adh rents. The Sufi orders which made their influence felt in Gujarat were the Chishtis, Suharwardis, Maghribis, Aydarusis, Naqshbandis and Shattaris. The Chishtis were represented by Shayakh Husam ad Din Multani, a disciple of Nizam ad-Din Auliya of Delhi, Kamal ad Din of Delhi, Rukn ad Din Maudud, Shaykh Yaqub bin Maulana Khwajagi and others. Probably the first representative of the Suharwardis was Sharaf ad-Din Mashhadi who lies buried at Broach. Qadi Alam ad Din Shatibi, Qutb-i-Alam of Vatwa and his illustrious descendants also belong to

the same order, though it must be said that Qutb i-Alam had also availed himself of saints belonging to the Maghribi, Chishti and other orders. Every visitor is struck by the magnificent mausoleum of Shaikh Ahmad Khattu at Sarkhej. His charming personality won many adherents to the Maghribi order. The Aydrus family belonged to Hadramant in Yaman. Their first representative to settle in Gujarat was Sayyid Shaikh bin Abd Allah who died in 990 A.H. (1582-83 A.D.). At present his descendants are to be found in Ahmedabd, Surat, Broach and Hyderabad (Deccan). One of his sons Abd al-Qadir, born of an Indian slave-girl, was a prolific writer. He is the author of an Arabic diwan and several other works. The most important of these is an-Nur as-Safir which contains very useful biographical information concerning the notables of Yaman and India flourishing in the tenth century of Islam. The Qadiris, Rifais and Naqshabandis also claimed a large number of followers. Muhammad Ghauth of Gwaliar introduced the Shattari order in Gujarat and Shah Wajih-ad-Din and his disciples made it popular. Besides the spiritual influence which these saintly persons exerted on the minds of the common people we should not lose sight of their contribution to the growth of the Hindustani language. The Hindustani sayings of Qutbi-Alam, Shah-i-Alam, Barak Allah and Wajih ad-Din Alawi are preserved in the pages of history. Qadi Mahmud Darya'i of Birpur, Shah Aliji Gamdhani and Khub Muhammad Chishti are the authors of poetical works. However this is a subject which requires separate treatment.

Arabic Poetry and Poets

Though the generosity of the Sultans of Gujarat had attracted scholars and poets from Arabia it would be difficult to point out in the sphere of Arabic poetry a genius of real worth. Sayyid Shaykh Aydrus, his son Abd al-Qadir, abd al-Mu'ti Qutb-ad-Din and Burhan ad-Din of Nahrwala and Makhdum Zada composed Arabic verses some of which are reproduced in an-Nur as Safir; Ala ad-Din Ata Muhammad who died at Ahmedabad in 986 A. H. (1578-79 A.D.), was known for his self-mortifying practices. He had also fallen a prisoner in the hands of the Portuguese after Bahadur Shah's defeat at the hands of Humayun. We are told by the author of Gulzar-i-Abrar that he used to compose Arabic verses after the style of the great Arab Sufi poet Ibn al-Farid. According to the same authority Ata Muhammad was the author of two diwans—Ujubat az-Zaman and Nadirat ad-Dauran which were popular among the lovers of poetry. Hajji Dabir showed his loyalty to his patron Asaf Khan, the minister of Bahadur and Mahmud III, by adopting Asafi as his nom de plume. The pages of his charming Arabic history bear an eloquent testimony to the fine poetical taste which he possessed. Sometimes he cannot resist the temptation of quoting his own Arabic verses in Zafar al-Walih. In the year 991 A. H. (1583-84) when he was at Chandor (Deccan) in the service of Sayf al-Mulk Miftah Ulughkhani, during his conversion with Muhammad 'Anbas Arab Khan Yafii, he was told by the latter that the nobles of Gujarat used to take particular care in the matter of educating their children. Looking to the state of affairs

prevailing in his own time Hajji Dabir found the contrast rather shocking and the poet in him gave a poignant expression to his feelings in Arabic verse.

Persian Poetry and Poets

As compared with Arabic Persian enjoyed a privileged position in India for the latter was the court language of Indian princes. It was in Persian that the poets would eulogise their patrons and the historians would record the achievements of their masters. For example in the glorious reign of Mahmud Begda we find three historical works known after his name. One of the historians was Fayḍ Allah Binbani of Gujarat who dedicated his Tarikh-i-Mahmud Shahi to Mahmud. The other two came from Shiraz. Shamsud Din Muhammad Zirak wrote his Maathir-i-Mamud Shahi in a highly ornate style. Abd al-Karim bin Ata Allah compiled a general history from the time of Adam to the death of Mahmud Begada and gave it the name of Tabaqat-i-Mahmud Shahi. It is obvious that such facilities did not exist for Arabic.

India has produced some distinguished Persian poets like Amir Khusrau whose greatness has been acknowledged even by the Persians. To our great surprise, we do not find a single poetic genius of high order and that too notwithstanding the keen interest shown by the Sultans in Persian language and literature. It may be that the sources at our disposal are not sufficient to enable us to form a correct estimate of Persian poetry produced in Gujarat under the Sultans. Whatever may be the case, we will, with the help of the sources available to us, try to give an account of Persian poetry in Gujarat.

Sultan Ahmad Shah is said to have been endowed with poetic genius. Of a qasida which he wrote in praise of Qutb-i-Alam of Vatwa only one couplet can be traced in Mir'at-i-Sikandari and Ahmadi. The royal chronicler of Ahmad Shah, Hulwi of Shiraz, chose to describe the achievements of his master in Persian verse. His Tarikh-i-Ahmad Shahi has been written in the mathnawi form and has been extensively quoted by the author of the Mir'at-i-Shikandari. The saint of Sarkhej, Shaikh Ahmad Khattu had an admirably good biographer in Ab-al-Qasim or Muhammad Qasim who collected the utterances of his spiritual preceptor under the title of Mirqat-al-Wusul. A perusal of the contents of this biography reveals that the saint was not only interested in reciting the fine verses of others but himself used to compose verses in Persian, Arabic, and Hindustani for the biographer has quoted his Arabic verses, Persian quatrains and Hindi dohras. Sayyid Uthman known as Sham-i-Burhani, used to compose fine Ghazals in Persian and one of the ghazals which he has written in imitation of Hafiz of Shiraz is quoted in the Mirat-i-Ahmadi. Fayḍ Allah Binbani who belonged to a family of scholars and dedicated some of his works to Mahmud Begada writes in the preface to his Majma-an-Nawadir that in addition to his bigger works he had compiled a few treatises in prose and verse both in Arabic and Persian. His Arabic and Persian verses seem to have been unfortunately lost. Sayyid Alif Khan (and according to Kajji Dabir Sayyid Asaf Khan) who was appointed along with Aziz al-mulk Shaykhan Sultani by Mahmud Begada to punish Shahryar Husam ad-Din, was a poet of no mean order. In the Mir'at-i-Sikandari are quoted two verses of a qasida which the Sayyid had composed in

imitation of a celebrated qasida of Amir Khusrau known as Bahr al-Abrar. Another poet who flourished in the reign of Muzaffar II was Qanii whose Tarikh-i-Muzaffar Shahi has been published. If we are to believe the statement of Qanii Muzaffar II also possessed a taste for Persian poetry. Malik Amin Kamal, the poet, was a boon-companion of Bahadur Shah. The author of the Mirat-i-Sikandari admires him for his fine sense of humour and repartee. Mulla Ayyub, a graceful poet, composed two verses exhorting the readers to take to opium-eating. When these verses were recited in the presence of Muzaffar II he smiled and said that the scribe had made a mistake in copying and by changing the first letter of the first word remarked that the Mulla, in fact, had condemned opium-eating. Ikhtiyar Khan Siddiqi who was one of the most accomplished ministers of Gujarat, gave a fine demonstration of his poetic talent in suggesting mu'ammas (riddles) for the names of Humayun and the poet Jamali who is said to have accompanied the Moghul Emperor to Gujarat. Shaykh Yahya Mufti's verses are quoted by the author of Sikandari on two or three occasions. It is possible that the same Yahya may be the author of a metrical inscription on the tomb of Shah-i-Alam. Shaykh Wajih ad Din Alawi used to compose Persian verses. His biographer Sayyid Husayni Pir has discovered some Persian ghazals written by the Shaylh. Mirza Sikandar, the author of Mirat, has also quoted some verses composed by himself. There may be many other poets like Sikandar but the fact remains that Gujarat has not produced a poet of a very high order in the Persian language.

Some Outstanding Achievements of the Learned Men of Gujarat

Before attempting an estimate of the importance of India's contribution to Arabic and Persian language and literature we must state clearly and unambiguously that Indian scholars began to write in Arabic at a time when even scholars outside India had concentrated all their energies or writing commentaries and glosses on the works of celebrated authors. This statement holds good equally concerning the Arabic works generally produced in Gujarat though it must be admitted that even in this limited sphere Indian contribution has been considered valuable.

It is generally believed that Shaykh Abd al-Haqq of Delhi was the first to introduce the science of Tradition into India and popularise it. It may be true of Délhi and Northern India but certainly not of the South for in Gujarat long before Abd al-Haqq commenced his work in Delhi the pupils of great traditionists like Shaykh al-Islam Zakariyya, Sakhawi and Ibn-Hajar of Mecca and the Scholars of Gujarat had made the science of tradition popular.

In respect of the exegesis of the Quran the scholars of Gujarat made a brilliant departure from the course generally followed by most of the commentators. An attempt was made to establish the interdependence of the verses of the Quran and to remove the misconception that there is no arrangement or order in the verses of this revealed scripture. The names of Makhdum Ali of Maha'im and Shaykh Hasan Muhammad Chishti of Ahmedabad may be mentioned as pioneers in this field. Closely associated with it is the question whether the Quran could be translated into other languages or not. Fortunately Muslim opinion in India has asserted itself

in favour of translation. Shah Wali Allah's Persian translation is generally supposed to be the earliest rendering of the Quran in India but the fact is that centuries before the distinguished theologian of Delhi flourished, Persian translations of the Quran were available in Gujarat. In the shrine of Shaykh Ahmad Khattu at Sarkhej is preserved a manuscript of the Quran embodying Persian translation which is generally attributed to the Shaykh by local tradition. Some pages in the beginning and at the end have been replaced at a much later date but the bulk of the work is intact in its original form. The exact date as to when it was transcribed is not known but those who are competent to express their opinion on the subject hold that it must have been transcribed in the ninth century of Islam. In several places the translation is explanatory. There is another Persian translation of the Quran in Vatva (Ahmedabad) in the custody of the present Sajjada nashin. Unless some evidence is forthcoming it is difficult to attribute it to someone. It is a probable guess that this translation may be a copy of the rendering made by Sayyid Muhammad Ridawi at the instance of Jahangir.

Numerous historical works have been written in Persian in India while in Arabic there have been written a very few works on history. Gujarat claims a big share of the historical works written in Arabic. Hajji Dabir's charming history and the two celebrated works of Mufti Qutbad Din of Nahrawala are a valuable contribution to historical literature.

Persian literature produced in India is at par with that produced in Persia itself. Indian scholarship has made a remarkable contribution to Persian lexicography. It redounds to the credit of Gujarat that one of its sons Fadl ad Din Muhammad bin Qiwam of Kadi compiled Bahr al Faḍa'il in 837 A.H. (1433-34 A.D.). The usefulness of this book was pointed out by the great Urdu scholar late H. M. Shayrani of Tonk in the monthly Makhzan of Lahore. The same author compiled a commentary on Nizami's Makhzan al-Asrar in 795 A.H. (1392-93 A.D.). In the words of Professor Shayrani it may be cited as a standard work on this subject.

Last but not the least, the contribution of Gujarat to Urdu language and literature is of immense importance for it was in Gujarat that Urdu for the first time received its definite literary form. The names of Bajan, Khub Muhammad Chishti, Aliji Gamdhani and others may be mentioned as being pioneers in the sphere of Urdu poetry.

Bibliography :—Mir'at-i-Sikandari ; Mir'at-i-Ahmadi ; Arabic History of Gujarat ; An-Nur as-Safir ; Gulzar-i-Abrar ; Akhbar al-Akhyar ; Subhat al-Marjan ; Yad-i-Ayyam.

INTER-RELATION OF THE ADHYĀYAS OF THE GĪTĀ

By

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It is proposed to examine here the inter-relation of the different Adhyāyas of the Gītā, which is an important factor in understanding the message of this Scripture. In the case of the Brahmasūtra, we know the inter-relation between the various Adhyāyas from their very titles, viz. (i) *Samanvaya* 'application of all Śrutis to Brahman' (ii) *avirodha* 'absence of contradiction' among the Śrutis, as well as between the Vedanta and other Schools of Philosophy, (iii) *sādhana* 'means of achieving Mokṣa, and (iv) *phala*, 'the goal'. If we are to judge about the inter-relation of the eighteen Adhyāyas of the Gītā from their titles, we should conclude that each Adhyāya teaches one particular aspect of the Yoga, the Gītā itself being a Yogaśāstra 'Science of Disinterested Action'. Madhusūdana Saraswatī considers the Gītā as being kāṇḍatrayī 'a set of three Books each of which comprises six Adhyāyas'. This view is not known to Śaṅkara or Rāmānuja nor is it consistent with the traditional titles of the Adhyāyas of the Gītā in which only certain Adhyāyas (and not kāṇḍas) are called *karmayoga* (Adh. III), and *bhaktiyoga* (Adh. XII), there being no Adhyāya simply called *jñānayoga*.[1] Śaṅkara often explains the inter-relation of the different Adhyāyas in his own way. According to him the topic of an earlier Adhyāya is to be connected with that of a succeeding one, though many Adhyāyas intervene between the two Adhyāyas in question. Modern critics, particularly western scholars who have constantly complained about the repetitions and contradictions in the Gītā do not seem to have paid proper attention to the problem.[2] Tilak has devoted one separate chapter of his Gītā Rahasya to the question of the harmony of the Adhyāyas of the Gītā. He tries to show that some point which was not made clear in each earlier Adhyāya is discussed in each *immediately* succeeding Adhyāya; but his explanations seem to be unsatisfactory. According to Śaṅkara, the essence of the Lord and His Manifestations (*vibhūtis*) are dealt with in Adhyāya VII, as well as in Adhyāyas IX and X, and a brief statement of the Manifestations (*vibhūtis*) is also given in verses 12-15 of Adhyāya XV[3].

1. Adhyaya IV is called कर्म ज्ञानसंन्यासयोग

The word ज्ञानयोगें occurs in Bha. Gi. XVI.1.

2. Hopkins :—Despite its occasional power and mystic exaltation, The Divine Song in its present state as a poetical production is unsatisfactory. The same thing is said over and over again and the contradictions in phraseology and in meaning are as numerous as the repetitions, so that one is not surprised to find it described as " the wonderful song which causes the hair to stand on end." Hopkins' view quoted by the Rev. D. MacKichan in his " Introduction."

3. सप्तमेऽध्याये भगवतस्तत्त्वं विभूतयश्च प्रकाशिता नवमे च । . . . Sankara's remarks at the beginning of his com. on Adh. X. Also, चतुर्भिः श्लोकैर्विभूतिसङ्क्षेपेमाह भगवान् Sa. Bha. on XV. 12. *Vide* also Sa. Bha. on XV. 16.

Adhyāya XVI details the three ethical types of beings, *daivī*, *āsurī* and *rākṣasī* mentioned in Adhyāya IX[4]. Śaṅkara says that Adhyāya XIV (in which as a matter of fact neither the word *kṣetra* nor the word *kṣetrajña* occurs) tells us how all that is a product is produced from the union of the *kṣetra* and the *kṣetrajaña*[5]. He remarks: In the seventh Adhyāya two Natures (Prakṛtis) were described. The same have been stated in the thirteenth Adhyāya as *kṣetra* and *kṣetrajña*. Moreover, the twelfth Adhyāya describes the devotees and Adh. XIII tells us about the philosophical knowledge with the help of which those devotees do their actions[6].

All interpreters of the Gītā, the Ācāryas or commentators as well as Western and Eastern scholars hold that all the eighteen Adhyāyas of the Gītā *taken together* give the full exposition of its teaching which is one and uniform. According to Śaṅkara, the Gītā aims at the attainment of Mokṣa by means of a firm foundation in knowledge (*jñānaniṣṭhā*) preceded by the renunciation of all actions; and each of the eighteen Adhyāyas makes its own contribution to this general Teaching. Tilak says that the Gītā teaches *karmayoga*, mainly based upon *bhakti* (devotion) and supported by *jñāna* (knowledge)[7] and each *subsequent* Adhyāya makes clear some point of this *karmayoga*, raised by each *preceding* Adhyāya. Thus, according to Tilak each Adhyāya says something about *jñāna*, *bhakti* and *karman*. We may here note that *karmayoga* is the title of the third Adhyāya only. The expression *"jñānamūlakabhakti viśiṣṭa karmayoga"* sounds like a shrewd and subtle compromise between Tilak on one side and Śaṅkara (*"jñānamūlaka"*) and Rāmānuja (*"bhaktipradhāna"*) on the other. We shall see later on that the title *karmayoga* is the name of only *one* aspect of Yoga which itself means "Disinterested Action".

At this stage, I may mention my own view. (*a*) The Gītā is traditionally known to be a *yogaśāstra*,[8] (*b*) The second Adhyāya gives two *definitions* of *Yoga*: (1) Equality of mind in the success or failure of one's undertakings is said to be Yoga[9] and (2) Yoga is the cleverness (*kauśala*) in actions[10]. (*c*) Each Adhyāya is

4. दैवी आसुरी राक्षसी चेति प्राणिनां प्रकृतयो नवमेऽध्याये सूचितास्तासां विस्तरेण प्रदर्शनायायं सत्त्वसंशुद्धिरित्यादिरध्याय आरभ्यते । Sa. Bha. on Bha. Gi. XVI. 1.

5. *Vide* Sa. Bha. on Bha. Gi. XIIV. 1.—सर्वमुत्पद्यमानं क्षेत्रक्षेत्रज्ञसंयोगात्

6. Vide Sa. Bha. on Bha. Gi. XIII.1— सप्तमेऽध्याये सूचिते द्वे प्रकृती ईश्वरस्य ।...क्षेत्राध्याय आरभ्यते । अतीतानन्तराध्याये च अद्वेष्टा सर्वभूतानाम्.....अयमध्याय आरभ्यते ।

7. According to Tilak the Gita teaches "ज्ञानमूलक भक्तिप्रधान कर्मयोग," or "ज्ञानमूलक भक्तिविशिष्ट कर्मयोग.

8. *Vide* the colophon at the end of each Adhyaya of the Gita: इति श्रीमन्महाभारते भीष्मपर्वणि श्रीमद्भगवद्गीतासूपनिषत्सु ब्रह्मविद्यायां **योगशास्त्रे** श्रीकृष्णार्जुनसंवादे अर्जुनविषाद**योगो** नाम प्रथमोऽध्यायः ।...सांख्य**योगो** नाम द्वितीयोऽध्यायः कर्म**योगो** नाम तृतीयोऽध्यायः ।...

9. सिद्ध्यसिद्ध्योः समो भूत्वा समत्वं योग उच्यते । II. 48.

10. योगः कर्मसु कौशलम् II. 50.

Note the *third* definition of योग given in the 6th Adhyaya:—

तं विद्याद्दुःखसंयोगवियोगं योगसंज्ञितम् । VI. 23.

called one particular Yoga, *e.g.*, the first Adhyāya is called not merely "*Arjuna-viṣādah*" but "*Arjunaviṣadayoga*", "The Yoga of the agony of Arjuna". These three facts make me conclude that the Central Teaching of the Gītā is Yoga meaning either Equality (of the mind in success or failure of one's undertakings) or the cleverness in actions (by which a man doing actions realises that he has renounced all good and bad deeds)[11] and that each Adhyāya gives one aspect or form of this Yoga according to its name in the colophon. The colophon may be looked upon as the earliest commentary on the Gītā. So *each Adhyāya is an independent unit by itself.* I give below the important arguments that have led me to this conclusion :—

(*a*) In the days of the Gītā or at least at one very important stage of its revisions, if there have been revisions at all, the word Yoga had a *rūdha* or conventional meaning. When the Gītā says *ucyate* ('is called'), *uktaḥ* ('has been said to be'), *āhuḥ, prathitaḥ, udāhṛtaḥ, smṛtaḥ, etc.*[12] it refers to the already technical or fixed terms in its days. So, the words with these qualifications are not likely to be vague or obscure in their meanings. To me Yoga seems to be a term with fixed sense because we are told "Equality *is said to be* Yoga (II.48). Besides, Yoga is declared to be a *saṁjña* 'an appellation' in Bha. Gi. VI. 23.

What was this fixed meaning ? It was 'Equality' of mind in the success or failure of one's undertakings (Bha. Gī. II. 48). It was psychological attitude of a man, which made him believe that he had renounced his actions, while actually he performed them (II.50). In Bha. Gī. VI. 20-23, a detailed description of this Yoga is given. All these descriptions of Yoga can be summed up by a general sense of the word Yoga, viz., 'Disinterested Action', *niṣkāma karman,* which should be applicable to the word wherever it occurs in the Gītā. This possibility of explaining whatever descriptions or definitions of Yoga are given in the Gītā, by the simple expression of 'Disinterested Action', together with the fact that in the Gītā, the word 'Yoga' is called a technical term (*saṁjña*) confirms my view that the word is not a vague, uncertain word in the Gītā ; and that it does not mean merely 'a Path', or Practice (as contrasted with theory or speculation, the sense often given to *sāṁkhya*), or Ascetism (C. V. Vaidya's view) or Harmony (a sense derived from its etymology), etc. In fact, the attempt to give an etymological sense or senses not supported by a specific use of the word 'Yoga' in the Gītā itself, does not seem to be an effort in the direction of the right interpretation of the word 'Yoga'.

(*b*) In the first six and some of the other Adhyāyas an attempt is made to show a connection between two consecutive Adhyāyas. But most of the Adhyāyas have an independent beginning. Thus, Adhyāyas VI, VII, IX, X, XIII, XIV, XV and XVI, have a beginning which hardly shows any direct or indirect dependence on the

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11. योगयुक्तो जहातीह उभे सुकृतदुष्कृते ॥ II. 50.

12. समत्वं योग उच्यते (II. 48), अव्यक्तोऽइत्युक्तः (VIII. 21), यं संन्यास मिति प्राहुर्योगं तं विद्धि पाण्डव । (VI. 1), अतोऽस्मि लोके वेदे च प्रथितः पुरुषोत्तमः (XV. 18).

immediately preceding Adhyāya[13], though they are in their own way, linked up with the Central Teaching of the Gītā. While the end of an Adhyāya does not make us feel that some point has remained incomplete or undeveloped, the taking up of a new one does not reveal the necessary dependence of its main Thesis on the foregoing Adhyāya. The relation between the last two verses of Adh. VII and the first verse of Adh. VIII is so superficial that the former clearly seem to have been placed where they are, just to show that Adh. VIII has something to do with Adh. VII[14]. If we carefully look to the first five Adhyāyas it appears that the second Adhyāya alone is closely connected with the first Adhyāya. In the remaining, *e.g.*, in the case of the connection between the Adh. XI and Adh. XII or that between the Adhyāya XVI and Adh. XVII, there do not seem to be any such ties of relation as between Adh. I and Adh. II. In the light of the *names* or *titles* of these Adhyāyas and their teaching, it seems that even these are independent units by themselves. Thus, as already stated above, the first Adhyāya is called *Arjunaviṣādayoga*, rather than *Arjunaviṣāda*. So, the tradition, which already existed before Śaṅkara, interpreted Adh. I as teaching one particular method of Yoga. It was believed to teach 'Disinterested Action' based upon an Agony *like* the Agony of Arjuna.

(*c*) This brings us to the evidence supplied by the names of all the Adhyāyas of the Gītā. We do not know, who gave these names to the Adhyāyas. But it is certain that Śaṅkara found them as they are today before he wrote his *bhāṣya* on the Gītā. Śaṅkara clearly tells us so, if and when he wants the name of an Adhyāya to be changed in his commentary. Thus Adh. III was called *Karmayoga*, but Śaṅkara would have it as *Karmaprasaṃsāyoga* (*Vide* his *bhāṣya* on it). I should also note that Sörenson has collected the traditional names of all the eighteen Adhyāyas as found in different MSS. or editions of the MBh., some of which differ from the names preserved by Śaṅkara. But, for our purposes it is sufficient to take the titles as given by Śaṅkara for whatever evidence they can offer us regarding the interpretation of each Adhyāya. I shall here examine the titles of some Adhyāyas to explain my view. I have already suggested that *Arjunaviṣādayoga* should mean Yoga or Disinterested Action (or Equality) based upon an Agony *like that* of Arjuna, because otherwise the word Yoga would be meaningless. The title *guṇatrayavibhāgayoga* (of Adh. XIV)

13. अनाश्रितः कर्मफलं कार्यं कर्म करोति यः । स संन्यासी च योगी च न निरग्निर्न चाक्रियः VI. 1). मय्यासक्तमनाः पार्थ योगं युञ्जन् मदाश्रयः । असंशयं समग्रं मां यथा ज्ञास्यसि तच्छणु (VII. 1). इदं तु ते गुह्यतमं प्रवक्ष्याम्यनसूयवे ज्ञानं विज्ञानसहितं यज्ज्ञात्वा मोक्ष्यसेऽशुभात् ॥ (IX. 1). भूय एव महाबाहो श्रुणु मे परंम वचः । यत्तेऽहं प्रीयमाणाय वक्ष्यामि हितकाम्यया ॥ (X. 1). प्रकृतिं पुरुषं चैव क्षेत्रं क्षेत्रज्ञमेवच । एतद्वेदितुमिच्छामि ज्ञानं ज्ञेयं च केशव ॥ or इदं शरीरं कौन्तेय क्षेत्रमित्यभिधीयते । एतद्यो वेत्ति तं प्राहु क्षेत्रज्ञ इति तद्विदः॥ (XIII. 1).

Vide also Bha. Gi. XIV. 1-2, XV. 1, XVI. 1, and XVIII. 1.

14. जरा मरणमोक्षाय मामाश्रित्य यतंति ये । ते ब्रह्म तद्विदुः कृत्स्नमध्यात्मं कर्म चाखिलम् ॥ साधिभूताधिदैवं मां साधियज्ञं च ये विदुः । प्रयाणकालेऽपि च मां ते विदुर्युक्तचेतसः॥ (VII 29-30). and किं तद् ब्रह्म किमध्यात्मं किं कर्म पुरुषोत्तम । अधिभूतं च किं प्रोक्तमधिदैवं किमुच्यते ॥ अधियज्ञः कथं कोऽत्र देहेस्मिन् मधुसूदन । प्रयाणकाले च कथं ज्ञेयोऽसि नियतात्मभिः ॥ (VIII. 1-2).

should be distinguished from the title *guṇatrayavibhaga* which is a fit name for a section in a Sāṁkhya work. The former would mean " Disinterested Action based upon the distinction among the three *gunas* of the Prakṛti." It will be shown later on that Adhyāya XIV aims at teaching a form of Yoga in which even the *sattvaguṇa* is believed to be the cause of *attachment* (attachment to *jñāna* 'knowledge' and *sukha* 'pleasure') and is therefore to be transcended by one who follows the Yoga[15]. The presence of the word "yoga" in *daivāsurasaṁpadvibhāgayoga* (Adh. XIV) and *śraddhātrayavibhāgayoga* (Adh. XVII) can be properly explained only if we assume that these Adhyāyas teach respectively a " Yoga based upon the distinction between divine endowment and demonaic endowment" and a "Yoga based upon the distinction between the three types of faith." In Adh. XVI those born with the divine endowment stand for the followers of Disinterested Action and those born with the demonaic endowment mean an extreme type of Vedic Ritualists who performed sacrifices for the sake of the promised rewards. The sattva guṇa in Adh. XVII is itself the indication of the stage of Disinterested Action (*Vide* the *sātvika yajña, tapas* and *dana* in Adh. XVII, 11, 17 and 20)[16], unlike the same in Adh. XIV. Adh. V is called *sannyāsayoga*, while in that very Adh. *sannyāsa* is said to be inferior to *karmayoga, i.e.*, an aspect of Yoga only[17]. In my opinion, the word *yoga* in *sannyāsayoga* would not be properly explained unless we take the title to refer to v. 13 of that Adhyāya and interpret it as " Disinterested Action based upon Mental Renunciation of all actions." By means of this attitude of mental renunciation the *yogin* believes that he does nothing nor does he help any body in doing anything. This attitude of mind is different from the other in which a *yogin* renounces the results (*phalas*) of his actions. As already stated the second Adhyāya gives two definitions of Yoga ' Disinterested Action ' ; and the attitude of the renunciation of *phalas* is समत्व " Equality " and is in harmony with its definition in Bha. Gī. II. 48, while *mental* renunciation of actions themselves while they are physically being done is in harmony with the definition of Yoga in Bha. Gī. II. 50. Verses 12 and 14 of Adh. V support my interpretation of Bha. Gī. V. 13. " *Moksasannyāsayoga* " is the title of Adh. XVIII and I believe it refers to v. 66 of that Adhyāya ; so, it means ' Disinterested Action ' based upon mental renunciation of actions (*sannyāsa=sarvadharmān parityajya*) and release (*mokṣa*) from all sins involved in the performance of one's duties, referred to by Arjuna in Adh. I and II. The remaining titles, *e.g., bhaktiyoga*, should be explained by interpreting *yoga* as ' Disinterested Action ' or ' Equaliy '.

Tilak calls the entire Gītā ' *Karmayoga,*' but *karmayoga* is the title of only the third Adhyāya (and of the teaching of Bha. Gī. II. 40-72, as said in Bha. Gī. III. 3d). ' *Karmayoga* ' means ' Disinterested Action through action itself " and perhaps this title of Adh. III is based upon such verses as *karmaṇaiva hi saṁsiddhimāsthitāh Janakadayaḥ* (III. 20), etc. Gandhiji has spoken of the *Gītā Bodha* (the teaching of

15. तत्र सत्त्वं निर्मलत्वात्प्रकाशकमनामयम् । सुखसङ्गेन बध्नाति ज्ञानसङ्गेन चानघ । (XIV. 6.)

16. अफलाकांक्षिभिर्यज्ञो विधिदृष्टो य इज्यते । यष्टव्यमेवेति मनः समाधाय स सात्विकः ॥ (XVII. 11).

Vide also XVII. 17 and 20.

17. संन्यासः कर्मयोगश्च निः श्रेयसकरावुभौ । तयोस्तु कर्मसंन्यासात्कर्मयोगो विशिष्यते ॥ (V. 2.)

the Gītā) as *anāsaktiyoga* " Yoga of the absence of the attachment to the results of actions done " ; but here also the word *anāsakti* is redundant because Yoga is itself "Disinterested Action." Moreover, *anāsaktiyoga* is a word which occurs *nowhere* in the Gītā. So, both the titles, *karmayoga* and *anāsaktiyoga*, are misleading.

(*d*) Now, let us examine the teaching of each Adhyāya of the Gītā. In my opinion, this investigation also leads to the conclusion that *each* Adhyāya is *an independent unit* and teaches *its own distinct form of Yoga*. (i) In Adhyāyas XVII and XVIII we are told that the *sattva guṇa* itself is the characteristic of 'Disinterested Action', while in Adh. XIV the *sattva guṇa* even is the cause of *attachment* (to knowledge and pleasure) and hence a yogin is asked to transcend the *sattva*[18]. (ii) In Adh. III and V the Prakṛti and Svabhāva are said to be the real doer (*kartṛ*), while the soul is declared to be neither a doer nor an enjoyer (*akartṛ—abhokṛt*), but in Adh. XIII, 21-22 a different view is given, *viz.*, that Prakṛti is the cause of activity (*kartṛtva*) while the *jīva* is *bhoktṛ* and can remain an *unattached bhoktṛ*, but when he becomes *attached* to the *guṇas* of the Prakṛti, he begins the mundane existence (*saṁsāra*). (iii) In Adh. III and V the Lord is spoken of as one not at all responsible for the sin and merit (*pāpa* and *sukṛta*), or *kartṛtva* and *karmāṇi* (activeness and actions) done by the soul, because everything is done by the Prakṛti or Svabhāva. But in Adh. XI the Lord declares Himself to be the Kāla, the destroyer of the world, and "active" (*pravṛtta*) there and then for the destruction of the people.[19] He says: I myself have already killed all these opponents of yours, be thou naught by my Tool[20]. (iv) Again, in Adh. XV the Ādya Puruṣa is said to be the source from which all ancient activity (pravṛtti) has spread out; and then the various activities of the soul (XV. 7-11), the sun's activity of illuminating the world, the earth's activity of sustaining all beings, the moon's activity of nourishing all herbs, the Vaiśvānara's activity of digesting the food (XV. 12-14), and other activities (v. 15) in which the activity of maintaining or governing (*bibharti*—v. 17) the three worlds is included—all these are *purā i pravṛttis* which have been traced to the Lord. In fact, *Puruṣottamayoga* 'Disinterested Action through Puruṣottama (*i.e.* by the identification of Puruṣottama with the source of all activities)', is the peculiar colour given to the Yoga in Adh. XV.[21]

(v) In Bha. GI. IX. 12-13, the Lord mentions three natures, *daivī*, *rākṣasī* and *āsurī* ; and it is stated that human beings *resort to* one of them. But in Adh. XVI, two natural endowments, *daivī* and *āsurī*, are described ; and it is said that people are born with them. (vi) Everywhere in the Gītā the individual soul is absolved of all *kartṛtva*, but Bha. Gī. XVIII. 13-17 presents a view in which the soul is *one* of a group of *five* responsible for all actions when a war-slaughter is made (*sākṁkhye kṛtānte*)[22].

18. *Vide* foot-note (15) *supra*. See Bha. Gi. XVII. 11, 17, 20,and XVIII.29, 36, etc.and contrast it with Bha. Gi. XIV.6.

19. कालोऽस्मि लोकक्षयकृत्प्रवृद्धो लोकान् समाहर्तुमिह प्रवृत्तः । 1 Bha. Gi. XI. 32.

20. मयैवैते निहताः पूर्वमेव निमित्तमात्रं भव सव्यसाचिन् ॥ 11 Bha. Gi. XI. 39.

21. Cf. also XVIII. 46. *Vide* the interpretation of यतः प्रवृत्तिर्भूतानाम् ।

22. पञ्चैतानि महाबाहो कारणानि निबोध मे । साङ्ख्ये कृतान्ते प्रोक्तानि सिद्धये सर्वकर्मणाम् । XVIII. 13.

To sum up, the different Adhyāyas aim at explaining the activity and actions in different ways and presenting thereby different *yogas* suitable to men of different temperaments. Thus, we have so many *yogas* making the Gītā a *Yogaśāstra* 'Scripture of Disinterested Action'. The same are referred to when the Gītā says 'Through *yogas* the same Abode is attained as is reached through *sāmkhyas*' (v.5)[23]. As some of these *yogas* or aspects of Yoga are *mutually conflicting*, we have to conclude that all aspects are not intended for one and the same man, but that the Gītā gives many options leading to the same result[24]. Every man should choose one particular *yoga* 'Disinterested Action', for his behaviour in the world and practise it in his every day life. None should think of *sannyāsa* of actions. Thus, he will be doing *lokasaṃgraha*, and avoiding any result of his actions for himself he would get Mokṣa.

(*c*) The Gītā speaks of *yoga*, not of *karmayoga*, which is, in my opinion, an aspect of yoga 'Disinterested Action'. This *yoga* itself is distinguished in the Gītā from *sannyāsa*, Renunciation of Actions. Only at times, the Gītā differentiates *'karmayoga'* from *sannyāsa*, because *'karmayoga'*, being an aspect of *yoga*, is naturally opposed to *sannyasa*. All the aspects of *yoga* or all the *yogas* are opposed to *sannyāsa*. Thus, we have the following statements :— (i) Bha. GĪ. II. 39 distinguishes *yoge buddhih* from *sāṅkhye buddhih*[25] (ii) In this world there are two ways of life, which the Lord has narrated to Arjuna in Adh. II, *viz.*, the life of *sāṁkhyas* through *jñānayoga* 'Disinterested Action based upon a kind of knowledge' and that of the *Yogins* through *karmayoga* 'Disinterested Action based upon action itself' (Bha. Gī. III. 3)[26]. The knowledge on which the *sāṁkhya* form of *yoga* is based is the discussion as to whether the soul is killed in a *saṁkhya* (a battle). (iii) The simple word *'Yoga'* is mentioned in Bha. GĪ. IV. 1, 2 and 3 where the Lord traces the history of the Yoga.[27] (iv) "There is nothing so purifying

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23. यत्सांख्यैः प्राप्यते स्थानं त द्योगैरपि गम्यते । V. 5.

Two सांख्य sare at least found in the Gita, one in II.39 and another in XVIII. 19.

24. विकल्पोऽविशिष्टफलत्वात् । Bra. Su. III.9.63. *Vide* my interpretation in my Critique of the Brahma sutra ; Part I : Interpretation of the Sutras, P. 232.

25. एषा तेऽभिहिता सांख्ये बुद्धिर्योगे त्विमां श्रुणु II. 39.

26. I interpret सांख्य as a form of 'Disinterested Action.' The Second Adhyaya (II.11-63) does not, in my opinion, describe the सांख्य as संन्यास, nor does Bha. Gi. XVIII. 13 say that सांख्य is संन्यास, Bha. Gi. V. 1-6 distinguishes between संन्यास on the one hand and सांख्ययोगौ on the other. There is no sentence in the Gita in which सांख्य is said to be संन्यास. The traditional title of Adh. II speaks of it as सांख्ययोग. So also Bha. Gi. XIII.25 mentions the सांख्ययोग.

27. इमं विवस्वते योगं प्रोक्तवानहमव्ययम् । IV. 1. स कालेनेह महता योगो नष्टः परंतप । IV. 2. सएवायं मया तेऽद्य योगः प्रोक्तः पुरातनः । IV. 3.

as knowledge. A man perfected by Yoga gets it of its own accord in due course within himself... Actions do not bind a man who has mentally renounced his actions by *Yoga* (*yogaḥ karmasu kauśalam* —II. 50) and whose doubts have been cut off by knowledge[28]. (v) O Kṛṣṇa You have once referred to the Renunciation of actions, and, now again, you speak of Yoga. Tell me, which one of these two is better, after proper thinking. *Sannyāsa* and *karmayoga* are both of them the means of Final Beatitude; but out of the two *karmayoga* is better than *karmasannyasa*[29]. Here *karmayoga*, an aspect of *yoga*, 'Disinterested Action', is contrasted with *sannyāsa*. But *'yoga'*, itself is distinguished from *sannyasa* in the verse which follows these. "But, O long-armed Arjuna! It is difficult to reach *sannyāsa* except through *yoga*, while a sage disciplined by *yoga* gets Brahma without delay"[30]. (vi) The follower of the *yoga* called *yogin* is described in Bha. Gī. V. 11 and 24. (vii) "He who without resorting to the fruits of actions performs all duties, is both a *sannyāsin* and a *yogin;* but one who is merely without 'fires' and without actions is neither. Know, what the Upaniṣadic sages have called Renunciation (*sannyāsa*) (Bṛ. Upa. IV. 4. 22) to be the Yoga of the Gītā, because there is no *yogin* who has not *renounced* all thoughts about the fruits of actions or the actions themselves, while doing them. Action is the cause of a sage's desire to persue *yoga* (and not *sannyāsa*). The cause why the same sage remains *yogārūdha* (and does not become *yogabhraṣta*—fallen from *yoga*) is (that he has attained) *śama* 'peace of mind' (VI. 1, 2, 3)[31]. In Bha. Gī. VI. 4, 8, 10 and 15 we have the use of the word *yogin* only and in VI, 16, 17, 37, the word *yoga* alone is met with. (viii) O Pārtha! Hear how you with your mind attached to Me and practising *yoga*, taking Me as your resort, will know Me in my entirety—(VII.1)[32]. In all these passages the Gītā uses the word *Yoga* in the sense of 'Disinterested Action' and it is contrasted with *sāmkhya* and *sannyāsa*. The *'yogin,* is also found in some verses. The word *karmayoga* stands for "Yoga through action", an aspect of Yoga. So, the Central Teaching of the Gītā is *yoga* "Equality'- or 'Cleverness in Actions'; and *"karmayoga"* is only an aspect of that *yoga*. *It is, therefore, not correct to say that 'karmayoga' is the teaching of the Gītā.*

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28. न हि ज्ञानेन सदृशं पवित्रमिह विद्यते। तत्स्वयं योग संसिद्धः कालेनात्मनि विन्दति। IV 38. योगसंन्यस्तकर्माणं ज्ञानसंच्छिन्नसंशयम्। IV. 41.

29. संन्यासं कर्मणां कृष्ण पुनर्योगं च शंससि। यच्छेय एतयोरेकं तन्मे ब्रूहि सुनिश्चितम्। संन्यासः कर्मयोगश्च निःश्रेयसकरावुभौ। तयोस्तु कर्मसंन्यासात्कर्मयोगो विशिष्यते॥ V. 1-2.

30. संन्यासस्तु महाबाहो दुःखमाप्तु मयोगतः। योगयुक्तो मुनिर्ब्रह्म न चिरेणाधिगच्छति॥ V. 6. योगयुक्तो विशुद्धात्मा विजितात्मा जितेन्द्रियः। सर्वभूतात्मभूतात्मा कुर्वन्नपि न लिप्यते॥ V. 7.

31. अनाश्रितः कर्मफलं कार्यं कर्म करोति यः। स संन्यासी च योगी च न निरग्निर्न चाक्रियः॥ यं संन्यासमिति प्राहुर्योगं तं विद्धि पाण्डव। न ह्य संन्यस्तसंकल्पो योगी भवति कश्चन॥ आरुरुक्षुर्मुनेर्योगं कर्म कारणमुच्यते। योगारूढस्य तस्यैव शमःकारणमुच्यते॥ VI. 1-3,

32. मय्यासक्तमनाः पार्थ योगं युञ्जन्मदाश्रयः। असंशयं समग्रं मां यथा ज्ञास्यसि तच्छृणु॥ V. 1.

(*f*) Elsewhere I have shown how several passages in the Gītā are, in my opinion, meant to explain various aspects or forms of *Yoga*, the latter always meaning 'Disinterested Action'. I shall here offer my interpretation of one such passage, *viz.*, Bha. Gī. XII 8-11, where, I believe, a few aspects of the Yoga are compared with one another from the standpoint of the ease or difficulty of practising each one of them, and yet all give the same result, *viz.*, freedom from the fetters of actions. Verse 8 gives the *bhaktiyoga, i.e.*, 'Disinterested Action based upon Devotion'. Verse 8A prescribes intense devotion and seems to me to be *the verse* which gives the name *Bhaktiyoga* to this Adhyāya. If this Yoga be not possible, then Arjuna may follow Abhyāsayoga, 'Disinterested Action based upon repeated effort, abhyāsa, (of concentration which is described in Adh. VI)'. If Arjuna is not able to follow Abhyāsayoga, he should do all his duties believing them to be the duties done already by the Lord, *i.e.* believing himself to be naught but a tool of the Lord, as taught in the eleventh Adhyāya. If Arjuna is not able to follow this *yoga* of the Lord (*madyoga-bhagavadyoga*), he should renounce the fruits of all the duties he might do. This will mean that Arjuna may take all actions to originate from Prakṛti, as in Bha. Gī. III. 27 or from Svabhāva as in Bha. Gī. V. 14, or as explained in Adh. XVI, XVII or XVIII. Here, we have four forms of Yoga and a comparison of them is given. Arjuna wants to know who are the best knowers of Yoga (XII. 1 *yogavittamah*) and the answer seems to be that those who know Yoga through Bhakti are the *yogavittamāḥ* and *yuktatamāḥ* (XII. 1-2) The result of each one of these *yogas* is the same, *viz.*, Mokṣa, and hence these are not different stages of *one* Yoga. Different persons may like different forms of *yoga* according to their circumstances and therefore several options are given, just as the Upaniṣads indicate various forms of meditation giving the same *phala* (Bra. Su. III. 3.69).

An explanation of Bha. Gī. XII. 12 is here necessary. I have given argument for my view of it elsewhere. To me the verse seems to give a reason as to why each succeeding one of the *Yogas* in verses 8-11 is said to be easier than each preceding one (Vide *hi* in v. 12A). Knowledge (*jnana*) is better and easier than *abhyāsa* 'repeated practice' (mentioned in Adh. VI), *dhyāna*, (which here means the *bhakti* stated in Adh. XI) is easier than *jñāna*, and the renunciation of the fruits of actions, is easier than *dhyāna*. From this renunciation, Peace is immediate. *Abhyāsa* and *karmaphalatyāga* are words which occur in this verse as well as in v. 9 and v. 11. The word *yoga* which occurs in v. 9b (*abhyāsayoga*) and v. 11B (*madyoga*) is absent in v. 12; this proves that v. 8-11 speak of the *yogas*, while v. 12 mentions *the comparison of the means* of those *yogas*. The comparison of the *yogas* (v. 8-11) and that of the means (verse 12) are both of them given from the standpoint of the *ease of practising the Yoga* or acquiring the means. The *yoga* of *sarvakarmaphalatyāga* is easier than the *abhyāsayoga* because the means (*sarva*) *karmaphalatyāga* is easier than the means known as *abhyāsa*. So far, I believe, there is no difficulty in the interpretation suggested by me. Because this part of my interpretation is supported by the very words of the verses in question, I suggest that *dhyāna* (which is here distinguished from *abhyāsa*, being mentioned separately) should here mean a form of Bhakti, particularly that form which would be the basis of the *viśvarūpadarśanayoga* (Adh. XI) called *Madyoga* in v. 11b. Thus, we have three *yogas* in v. 9b, 10 and 11, and three corresponding means, *viz.*, *abhyāsa*, *dhyana*, and *kar-*

maphalatyāga in v. 12. Now, because the word *jñāna* occurs as the name of a means easier than *abhyāsa*, I suggest that perhaps the author of the Gītā meant that a *yoga* like the *saṁkhyayoga* which is based upon *jñāna* a kind of knowledge (cf. *jñāna-yogena sāmkhyānām* Bha. Gī. III. 3) is easier than the form of Yoga called *abhyāsayoga*, though, of course, *sāmkhyayoga* or any such other *yoga* is not mentioned between *abhyāsayoga* and *madyoga* in v. 9 and 10 respectively.

In my opinion, the above passage (Bha. Gī. XII. 8-11) shows that in the Gītā forms of Yoga 'Disinterested Action' are elaborated and that they are meant for persons of different aptitudes because they all lead equally to the same goal.

(g) Let us now consider the word 'Upaniṣad' (plu.) in the colophon of the Adhyāyas of the Gītā. We are told: "Thus, in the *upaniṣads* sung by the Lord [33]. So, here we are concerned with the *upaniṣads* which the Lord has Himself sung. The expression cannot mean 'the *upaniṣads*, the substance of which is sung by the Lord in the Gītā'. We should also note that the loc. (plural) form '*upaniṣatsu*' is to be construed with the Loc. forms, *viz.*, *Brahmavidyāyām, yogaśāstre, śrīkṛṣṇā-arjunasaṁvade.* So, in the Gītā, we have *a number of upaniṣads sung by the Lord.*

The Gītā borrows the expressions and some times some doctrines of the Upaniṣads, *e.g.*, from the Kaṭha Upaniṣad, the Bṛ. Upa, and the Mu. Upa. But these Upaniṣads are not sung by the Lord. We are concerned with the Upaniṣads in the Bhīṣmaparvan (Parvan VI) in the Mahābhārata, and they are inseparable from the other appelations, *viz.*, Brahmavidyā, etc. Thus, even the first Adhyāya will have to be explained as an *upaniṣad.*

I may here state the meaning of the word '*upaniṣad*' which suggested itself to me when I was studying some *sūtras* of Bra. Sū. IV. 1, where the topic of the sins and merits of a Brahmajñānin, is discussed. 'The agnihotra, etc., become useful to the *jñānin* just for the attainment of Mokṣa, the result (*kārya*) of that (*i.e.*, *jñāna*, knowledge), because we have examples of it in the Upaniṣads'. 'Some hold the view that also other good deeds than the *agnihotradi* are useful for the same result as that of the *jñāna*'. Because the Śruti—that act alone is more powerful, which a man performs with the *vidyā*, *śraddha* and the *upaniṣad*—refers to the usefulness of the *agnihotradi* as well as other deeds for the result of the knowledge, *i.e.*, for the achievement of Mokṣa.[34]

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33. इति श्रीमद्भगवद्गीतासु उपनिषत्सु.....।

34. अग्निहोत्रादि तु तत्कार्यायैव तद्दर्शनात् । Bra. Su. IV. 1.16.

अतोऽन्यापि ह्येकेषाम् । Bra. Su. IV. 1.17.

उभयोः यदेव विद्ययेति हि । Bra. Su. IV. 1.18.

Vide my interpretation of these Sutras in my *Critique of the Brahmasutra* : Part I : Interpretation of the Sutras. Pp. 434-445.

Here Bra. Sū. IV. 1.17 which mentions the view of *'some (ekeṣām)* seems to me to refer to the view of the Gītā, that all deeds including the deeds of one's caste if dedicated to the Lord, become useful in the attainment of Mokṣa. These followers of the Gītā quoted in support of their view the Śruti: "That act alone is more powerful which a man performs with the *vidya*".[35] The act in question can be interpreted to be referring to any deed and it *was* actually so interpreted, it seems to me, by these followers of the Gītā. The author of the Brahmasūtra looks upon only *agnihotrādi* as the deeds which co-operate with *jñāna* for a common result, *viz.*, Mokṣa, because he puts forth the other view as that of "some" only (*ekeṣām* in Bra. Sū. IV. 1.17).

When I was reading the above śūtras simultaneously with the Gītā and was trying to find out what *upaniṣads* are given in the Gītā, the idea suggested itself to me that the word *upaniṣad* (plu.) in the colophon, refers to the same word in the above Śruti, *viz.*, Chā. Upa. and means "*an explanation useful in the performance of a deed*, which if done with knowledge of that secret explanation will bring a more powerful result" (*vīryavattara*). In the Śruti, '*upaniṣadā*' is to be connected with *karoti* 'performs'. In my opinion, the Gītā has about *twenty-five different keys of avoiding the phala* while performing a deed. The deed done with this secret knowledge, does not stain a man with its results but rather helps him in the attainment of liberation, holds the Gītā. Those 'keys' are referred to by the plural number of '*upaniṣatsu*'. The Lord has collected and "sung" in verses about 'these keys' or secret explanations and they are preserved in the Gītā. Thus, every Adhyāya of the Gītā has got some of these keys.

So, I just suggest that the expression '*upaniṣad* sung by the Lord' (*śrimadbhagavadgītasu upanisatsu*) also proves that in the Gītā we have many *yogas* or aspects of 'Disinterested Action', and that each Adhyāya has its own *Yoga*, thus, each Adhyāya being an independent unit.

(*h*) Lastly, it appears to me as I hope to show elsewhere that the philosophical doctrines of the Gītā are auxilliary to the Yoga-teaching of the praticular Adhyāya in which they are mentioned. Thus, the doctrine of the two *prakṛtis* and *śrī Kṛṣṇa*, who is their master, is useful for the Disinterested Action taught in the seventh Adhyāya only, and is not to be mixed up with the philosophical views in the other Adhyāyas of the Gītā, in the fond hope of forging out a pre-conceived philosophical system out of the Gītā. I suggest that this is also a reason why each Adhyāya of the Gītā is an independent unit.

Conclusion:

While presenting different aspects of *one and the same topic* in different Adhyāyas, an author cannot fully avoid all repetitions, nor can he abstain from making some statements which may seem contradictory. This is what has happened with the author of the Gītā who intended to collect and state different forms of Yoga, 'Disinterested Action', in the different Adhyāyas of his book. So, what have appeared

35. यदेव विद्यया करोति श्रद्धया उपनिषदा तदेव वीर्यवत्तरम् । Cha. Upa.

to Böhtlingk, Hopkins and Garbe to be useless repetitions and contradictions are to me in fact the requisite remarks no author with an aim like that of the Gītākāra, could have avoided without being open to the charge of making incomplete and incoherent statements about his views.

Thus, the various *yogas* are meant for various types of men and when the Gītā speaks of '*ananyayoga*' it endeavours to lay stress on the fact that a man must adhere to one specific *yoga* and should not mix up different *yogas* if he wants to realise any *yoga* in his own every day life[36]. The Gītā explicitly mentions many *yogas* when it says: That abode which is attained by the various aspects of *sāmkhya* is also reached by the various aspects of *Yoga* (V. 5.)[37].

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36. अनन्येनैव योगेन मां उपासते । Bha. Gi. XII. 6.

37. *Vide* (29) supra.

ON ETYMOLOGY OF "JAUHAR"

By

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The act of *Jauhar* is closely connected with mediaeval Rājput history, and the word *Jauhar* is current in New Indo-Aryan languages like Hindi, Gujarāti and Rājasthāni. *Jauhar* was heroic self-immolation of Rājput damsels by burning themselves alive on the funeral pyre to save them from falling into the hands of the enemies. One can find a large number of instances of *Jauhar* from the mediaeval history, the most memorable ones being that of Chittor, besieged by Allāuddin Khalji, when Rāni Padminī had burnt herself to ashes with 16,000 Rājput women, and that of Jesalmer, when not less than 24,000 women and children had performed *Jauhar*.

Etymologically the word *Jauhar* has been explained in more than one ways. The *Hindi Śabda Sāgar* derives it from Sanskrit *Jīvahara* which is absurd on the face of it, being phonetically impossible. According to Grierson, the word has been derived from Skt. *Jatu-gṛha* (Lac-House). Vincent Smith writes (*Akbar, the great Mogul*, P. 72, footnote), "Sir George Grierson permits me to announce that he has discovered the etymology of the word *Jauhar*. It is the Prakrit *Jaühar* (Jain story of Bambhadatta in Jacobi, *Ausgewahlte Erzahlungen in Mahāraṣtri*. P. 5, l. 57), representing the Sanskrit word *Jatu-gṛha*, the "lac-house" of inflammable material in which their enemies tried to burn the Pāṇḍavas alive (*Mahābhārata*, I, Chaps. 141-51)."

Of course, in the Prakrit story of Bambhadatta though *Jaühar* means nothing but 'lac-house', (Sanskrit *Jatu-gṛha*), the same etymology cannot be applied to *Jauhar* of Rājput ladies, because the act has no connection whatsoever with *Jatu-gṛha*. I venture to suggest that *Jauhar* meaning 'Self-immolation by entering fire' has been derived from Skt. *Yama-gṛha*>Pkt. *Jamahara*. Following references from Apabhraṃśa and Old Western Rājasthāni literature will prove this almost conclusively :—

(१) सम्मंति बोलाविउ जु...रे तुम्हं नायग खूटउ आज ।
जं जिणरायह ढूकउ एहु, **जमहरु** लहसिइ नीसंदेहु ॥

—*Bhavyacarita* of Jinaprabhācārya, * Verse 33.

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*Jinaprabhacarya was a Jain ascetic-poet, who flourished in Gujarat during the 13th century of the Vikram Era. He has written several poems in a post-Apabhramsa dialect prevalent in Gujarat of his times.

Here *Jamahara* contextually retains the sense of its original, *Yama-gṛha*, and means simply 'death', and not the 'the act of *Jauhar*' which seems semantically a comparatively latter development. *Bhavyacarita* is an allegory describing victory of *Jina*, the Jain *Tīrthankar* over *Moha* or ignorance. Here in the said reference a messenger of *Jina* says to a general of *Moha* that the latter is sure to go to the 'abode of death' (*Jamahara*).

But most decisive references we get from the *Kanhaḍade-Prabandha*, A heroic poem in OWR, composed by poet Padmanābha at Jhālor in Rājputānā in V.S. 1512. The poet was a protege of Akherāja, the then ruler of Jhālor. The poem is written in praise of one of Akherāja's forefathers, Kānhaḍade. It describes the invasion of Allāuddin Khalji on Jhālor, reason of the onslaught being the fact that the Chauhān ruler of Jhālor had not allowed the Muslim army to pass through his territory when it was invading Gujarāt. The poem also describes how the Rajput prince offered a heroic resistance to the overwhelming forces of the Sultan of Delhi, and how when he lost all hopes of retaining the fort he and his feudatories fought for death and their women-folk performed *Jauhar*. There the act of *Jauhar* is referred to as *Jamahara*. We may see a few references :—

(२) राणी भणइ–विमासु किस्यूं ? अम्हे सवि **जमहर** पइसस्यूं ।
हिन्दू तणइ मानीइ गाइ, तेह तणू लोही जल माहि ॥ (II 146).

(३) 'चाहुआणनूं गिरुउं राज, रुडूं अह्मे भवाडूं आज ।'
राणी बोल इसिउ ऊचरिउ, 'इम जाणेजो **जमहर** करिउ ॥ (II 147).

(४) जयतलदे, भावलदे, उमादे अनइ कमलादे राणी ।
जमहर तणी करइ सजाई, वात हीआ मांहि आणी ॥ (IV 228).

(५) राउत सवि तणां जे माणस, तेह साथ नवि छांडइ ।
करइ जुहार सूइ सवि आवी, घरि घरि **जमहर** मांडइ ॥ (IV 131).

(६) हाहाकार हुउ तिणिं वेला, राणी **जमहर** पइसइ ।
सरले सादि सहू हरि बोलइ, **जमहर** इणि परि दीसइ ॥ (IV 239).

(७) पंनरसिं चुरासी गढि **जमहर** जालोहर निवेस ।
लोक सवि अंतेउर पूठि हो, **जमहरि** करिउ प्रवेस ॥ (IV 242).

(८) अंतेउरी अकुलीणी नथी, **जमहर** तणी करि सागथी ।
स्नान दान देहेरासर करी जमलि रही सवि अंतेउरि ॥ (IV 296).

(९) राणी वचन इस्यां उचरी, **जमहर** तीरिं गँई संचरी ।
पावक सेव्यु विषम तिणि रंगि, आहुति करि तेहने अंगि ॥ (IV 302).

These references leave no doubt that NIA *Jauhar* is derived from Skt. यमगृह>जमहर>जँवहर>जउहर>जौहर. Phonetically as well as semantically this would be most apt derivation. Old Hindi poets like Malik Mohammad Jāisi have used *Jauhar* (vide *Hindi Śabda Sāgar*) and not *Jamahara* in their compositions, but these references would show that both the forms are derived from *Yama-gṛha*, the former showing a final and the latter an intermediate stage of development.

The word *Jamahara,* from which *Jauhar* is derived, has left several offsprings also, at least in Gujarati language. Words जमर and झमर, जमोर and झमोर are fairly current in modern Gujarāti. These words are used for 'collective suicide of the *Bhāṭas* (bards) burning themselves alive as protest against an insult inflicted upon them'. A. K. Forbes in his *Rāsamālā,* which is a history of Gujarāt based mainly on bardic tradition, has noted down a tradition according to which a large number of *Bhāṭas* had performed झमोर at three different places near Pāṭaṇ in North Gujarāt as a mark of deep agony and protest against an insult from Kumārpāla, who was the then ruler of that city. These Gujarāti words may be derived as follows :—

यमगृह>जमहर>जमर>जमोर

यमगृह>जमहर>झमर>झमोर

The word झमोरियो (meaning 'one who performs झमोर') is also current in Gujarāti.

The co-relation of Hindi, Gujarati and OWR usage would go to prove that just as Skt. *Jīvahara* has no etymological connection with *Jauhar,* Skt. *Jatu-gṛha* also, suggested by Grierson, becomes redundant, because it is a different word altogether and cannot explain the sound म which is retained in OWR and Gujarāti forms.

I would like to know more about relevant references of Old Hindi literature from Hindi scholars*.

*Paper accepted at the 16th All India Oriental Conference held at Darbhanga.

THE SAINDHAVA DYNASTY OF BHŪTĀMBILIKĀ

By

HARILĀL RAṄGILDĀS MĀṄKAḌ, JĀMNAGAR

Some years back an interesting find was discovered at Ghūmlī, a small hamlet some sixty miles south of Jāmnagar in the then Kāthiāwād. It consisted of six sets of copper-plate grants issued by the rulers of the Saindhava dynasty from their capital called Bhūtāmbilikā, the modern Ghūmlī situated just south of the Bardā Hills in the ex-Nawānagar State. The plates belong to the sixth century of the Gupta Era (ninth century of the christian era). They are now handed over to the Archæological Department of the State, now the United State of Saurāshtra.

2. These plates were edited* by the late lamented Mahāmahopādhyāya Hāthibhāī Hariśaṅkar Śāstrī on behalf of the then Nawānagar State. They were also edited† by Dr. A. S. Aḷtekar of the Benāras Hindu University in the Epigraphia Indica. The following are the orders and details of the plates as given by the two scholars.

3. According to Śāstrījī the plates are issued by Rāṇaka I, Jāīka I, Jāīka I, Rāṇaka I, Agguka II, Jāīka II, respectively. He has not decided anything about the first Jāīka‡ of plate D, who occupies the place of Kṛṣṇarāja of plates A and F. His details are as follows :—

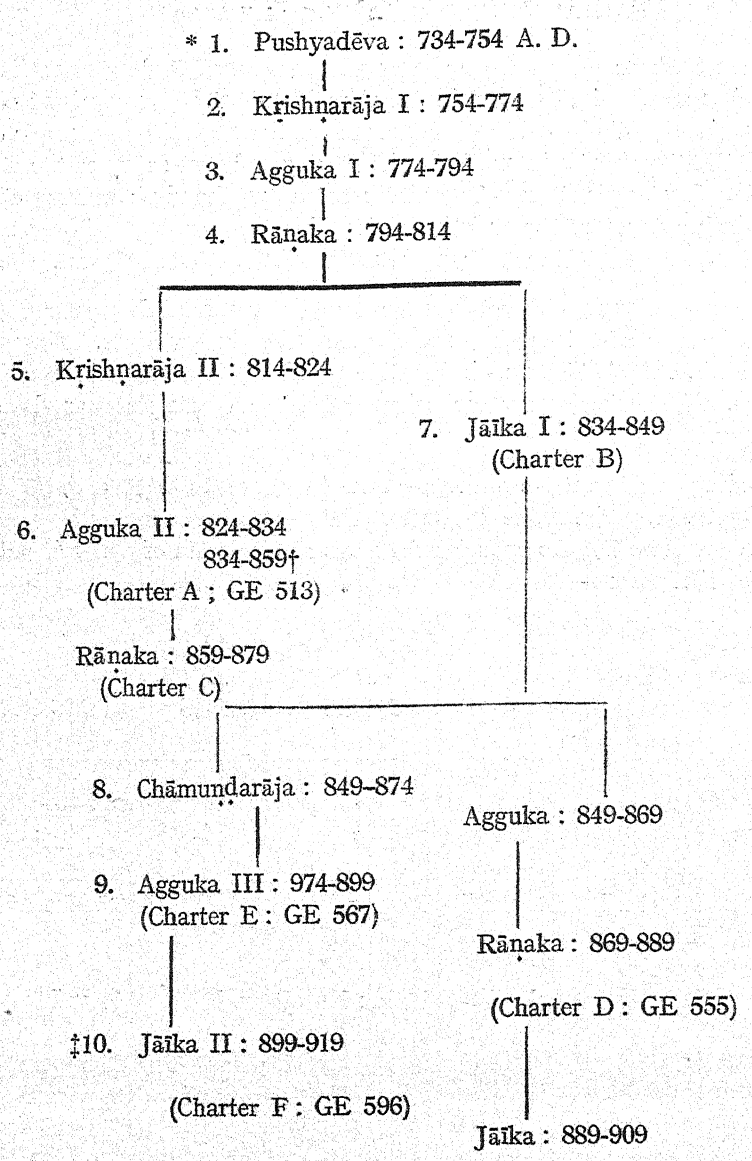
No.	Plate A Year—	B 513	C —	D 555 GS	E 567 GS	F 596 GS
1				‡		Puṣyadeva
2	Kṛṣṇarāja			Jāīka ?		Kṛṣṇarāja
3	Agguka I	Agguka I	Agguka I	Agguka I		Agguka I
4	Rāṇaka I	Rāṇaka I Kṛṣṇarāja Agguka	Rāṇaka I	Rāṇaka I		Rāṇaka I
5		Jāīka I	Jāīka I	Jāīka : ? ‡ Yuvarāja	Jāīka I	Jāīka I
6					Cāmuṇḍarāja	Cāmuṇḍarāja
7					Agguka II	Agguka II
8						Jāīka II

* The Report on the Twelve Copper-plate Inscriptions found at Ghumli.

† Six Copper-plate Grants from Ghumli : Vol. XXVI, No. 27.

‡ This discrepancy has been discussed and explained in paragraph 28 infra.

4. According to Dr. Altekar the charters are issued by Agguka II, Jāika I Rāṇaka (Senior), Rāṇaka (Junior), Agguka III, Jāika II, respectively. It will be seen that the tree below gives three collateral lines of rulers and assigns the charters C and D to the two Rāṇakas issuing them as subsidiary feudatories. This is his tree :—



* Dr. Altekar's transliteration.

† This is the time of his rule as a feudatory of his uncle Jaika I and cousin Chamundaraja.

‡ Numbers denote the main line.

5. I quote hereunder *in extenso* the relevant portions of Dr. Altekar's discussion on the above genealogy for the proper grasp of the subject-matter and give my observations thereupon.

6. As regards his charter C he says: "Pushyadēva or Pushyēṇa was succeeded by his son Kṛishṇarāja and the latter by his son Agguka I, whose rule may be approximately placed in the periods from 435 to 455 G.E. (A.D. 754 to 774) respectively." (P.189).

7. "Agguka I was succeeded by his son Rāṇaka who may be presumed to have ruled from *c.* G.E. 475 to 495 (A.D. 794 to 814). M. M. Shāstrī Hāthībhai Harishankar has attributed charter C (his Plate A) to this ruler; it will, however, be shown in the introduction* to that plate how his attribution is untenable. We have so far recovered no grant by this ruler." (P.190).

8. "*In view of the genealogical data of charter F the above view undoubtedly appears as the most plausible one,*† but there are serious difficulties in accepting it. A comparison of the text of the present charter with that of charters A and B makes it clear that it presupposes the knowledge of the latter and is based upon them. Thus the expression ‡hēl-āhlādita-sakala-suhṛil-lōkaḥ in 1.3 of the present charter gives no meaning whatsoever; it is an unintelligent abbreviation of §sva-hṛidaya-samihita-vibhavadāna-hēlā-samāhlādita-sakala-suhṛil-lōkaḥ of charters A and B, l. 4; similarly ‖karavāla iva parivāra-nirapēkshaḥ in l. 5 of the charter presupposes a knowledge of ¶karavāla iva-āpavarjita-sahaja-kalaṅka-śaṅkaḥ parivāra-raksha ānapēkshitaspashṭa-dṛishṭa-śaktiḥ of charter A, l. 6 and charter B, ll. 5 and 6. The present charter is thus later than charters A and B, though the names of his father and grand-father were Agguka and Kṛishṇarāja respectively." (P.208).

9. "It is no doubt possible to rebut the force of the argument above by contending that the present charter does not presuppose a knowledge of charters A and B, but that all of them are based upon a still earlier grant, which served as a prototype for all the three charters. This contention is however purely hypothetical and will continue to remain so, till an earlier grant is actually discovered and shown to be the prototype of the drafts of the three charters." (P.208).

10. It will be seen that Dr. Altekar relies here almost wholly upon assumption and presumption only. It can very well be argued that instead of this charter C being too short and unintelligible a contraction (which in fact it is not and does read good and intelligible sense) the charters A and B are a euphemistic amplification

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* See next paragraph.

† Italics are mine.

‡ हेलाह्लादितसकलसुहृल्लोकः

§ स्वहृदयसमाहितविभवदानहेलासमाह्लादितसकलसुहृल्लोकः

‖ करवाल इव परिवारनिरपेक्षः

¶ करवाल इवापवर्जितसहजकलंकशंकः परिवाररक्षानपेक्षितस्पष्टदृष्टशक्तिः

of the charter's sinoptical phrases. But what is the good of that argument when the case can conversely be argued with equal force? It is better to take it on its face-value and not to try to seek a discussion the other way round.

11. He next discusses the identification of Queen Kṣemeśvarī* the wife of Rāṇaka to whom there is an allusion in this charter and tries to connect her with Kṣemarāja of the Cāvadā dynasty of Gujarāt, as sister or daughter, just as Śāstīrji does it as the wife of Kṣemarāja! I think the discussion about Kṣemeśvarī is not at all worth the trouble based as it is purely on conjecture; and who knows Kṣemeśvarī may be altogether any other lady as well.

12. But as he himself in another† context concedes the contention to be "purely hypothetical and will remain so," I do not pursue the matter any further. I think it is safe and better in the absence of any other concrete evidence, to assign this grant to Rāṇaka I who is the fourth ruler from Puṣyadeva. So as it is I agree with the Mahāmahopādhyāyajī and place this plate (charter C) first in the series and call it Grant A.

13. For charters A and B Dr. Altekar tackles the points in this way:— "Two sons of king Rāṇaka figure in charters A and B, of these Kṛishṇarāja II was the elder and Jāīka I was the younger. They were half-brothers, for Jāīka is expressly described as ‡vaimātro bhrātā in charter A. Kṛishṇarāja II succeeded his father in due course in c. 495 G.E. (A.D. 814)." (P. 190).

14. "Kṛishṇarāja died comparatively young; for charter A shows that his son and successor Agguka II was a young boy at his death and the administration had to be carried on by his uncle Jāīka. Since the charter is issued in 513 G.E. (A. D. 832-3), and since by that time the plan of usurpation of Jāīka was complete we may place the death of Kṛishṇarāja II in c. 505 G.E. (c. 824 A.D.). He thus had a short reign of ten years only." (P. 193).

15. "Poor Agguka, the son and successor of Kṛishṇarāja II, shared the usual fate of minor rulers, who have the misfortune of having as their guardians ambitious and unscrupulous uncles. Agguka had such an uncle in Jāīka and he was his step-uncle too. In charter A, ll. 23-24, Jāīka no doubt boasts that though Kamalā (Royal Fortune) was anxious to be united to him in preference to Agguka, her rightful lord, he spurned her wily overtures and decided to be the disinterested guardian of his young and inexperienced nephew. *This profession however is belied by the indications given by other parts of the charter; he does not give the usual titles of a reigning feudatory to his nephew but takes them for himself. The grant of the village*

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* .....श्रीराणक:.....अनुबोधयत्यस्तु वः सुविदितं यथा मया स्वभुज्यमान..... कृत्वाग्निसाक्षिकाक्षीणप्रीतिरक्षणनिमित्तायकृतपरिणयनाया राज्ञीश्री क्षेमेश्वर्या

(Here the first plate is completed and the text remains incomplete as the second plate is not found.)

† See para 9 above.

‡ वैमात्रो भ्राता

*also has been made, not in the name of the minor heir, but in that of the so-called regent himself. In the colophon of the charter, its writer also refers to Jāika, and not to Agguka, as the reigning king.** It is therefore clear that the plans of usurpation took place before the issue of charter B, where we find Jāika I mentioning himself as the ruling king, and †omitting all references to his elder brother and his son in the genealogy. (P. 193).

16. "It would appear that Jāika I allowed Agguka to rule as a feudatory under himself after he had usurped the throne, exercising jurisdiction over a portion of his kingdom. For we find Agguka's son Rāṇaka issuing the land-grant mentioned in charter C." (P. 193).

17. Here we have to examine the learned doctor's issue and its corollary, whether charter A was issued by Jāika I as regent and whether Agguka continued to rule as a feudatory of his uncle Jāika after he had dispossessed him of his ancestral throne. M. M. Śāstrījī adopts the view that the donor of the grant was the usurper king Jāika I. Dr. Aḷtekar prefers to actually recognise the grant as issued by Agguka II but as a protege of Jāika the so-called regent. I believe that there is nothing in the text of the charter A to warrant the doctor's presumptive conclusions.

18. Dr. Aḷtekar's mainstay seems to be his interpretation of the text which runs thus :—.....श्रीकृष्णराजाभिधानोतिधन्यस्तनयोभूत् तस्य भ्राता वैमात्रो ज्येष्ठं तत्सुतमुचित-कुलक्रमागताक्रान्तसिंहासनमापि परित्यज्य श्रीमदग्गुकाख्यं ख्यातपौरुषजयिसत्वधामवक्षस्थलीलीला लालसया कमलया निश्शंकमालिंगितो अयमेव निजपितृप्रवर्द्धितमदीयलालनपालनयोग्य इति समरशत .....स समधिगताशेषमहाशब्दमहासामन्तश्रीजाईकः सर्वानेवात्मीयान्.....अनुबोयति.....

19. It seems the sentence has been construed by Dr. Aḷtekar somewhat thus as could be guessed from his free translation hinted in para 15 cited above :—..... .....ख्यातपौरुष.....मालिंगितो परित्यज्य तस्य भ्राता वैमात्रो श्रीमदग्गुकाख्यं ज्येष्ठं तत्सुतमुचित .....सिंहासनमापि अयमेव निजपितृ.....योग्य इति.....श्रीजाईकः सर्वानेवात्मीयान्..... अनुबोधयति.....

20. It seems here he takes जाईकः as the subject of परित्यज्य and the speaker of the words अयमेव...योग्य. This however is not the natural order. In the place of this distorted order of words, the following construction is plain, easily understandable and more true to the meaning and spirit of the writer :—..... .....उचितकुलक्रमागताक्रान्तसिंहासनमापि श्रीमदग्गुकाख्यं ज्येष्ठं तत्सुतं परित्यज्य ख्यात-पौरुषपुरुषजयिसत्वधामवक्षस्थलीलीलालालसया कमलया अयमेव निजपितृप्रवर्द्धितमदीयलालनपालनयोग्य इति निश्शंकमालिंगितो तस्य वैमात्रो भ्राता.....श्रीजाईकः सर्वानेवात्मीयान्...अनुबोधयति.....

21. This will give the meaning that even though Agguka had ascended the throne after Kṛṇarāja II in his natural right of heredity he was dispossessed of that

* Italics are mine.

† For this ommission see para 29 below.

Gādī by Jāīka his step-uncle who succumbed to the earnest entreaties of Kamalā who saw in Jāīka a better royal patron to fulfil her fond desires! In plain words this means that Jāīka I usurped the throne from Agguka II and the euphemistic language was used to explain away his recent misdeed. This was of course due to the family feud that might have been brewing for a long time between the children of the step-mothers. This is the meaning taken by M. M. Śāstrījī also. I believe it is more wordly to explain a political misdeed in such high-flown and affected words rather than to use such insulting words about the reigning prince by the regent showing his own open sovereignty over him. I think this sets right the wild gamble of otherwise plain words which do not in any sense say that Agguka was young and minor and that Jāīka was his regent. Thus there is no possibility of Agguka ruling as a vassal of Jāīka and the third Rāṇaka of Dr. Aḷtekar has no existence. In the text of the charter it is said that *(1) Jāīka had actually set aside (परित्यज्य) Agguka, †(2) Jīāka himself passed the order to his ministers and others, ‡(3) Jāīka took to himself all the titles of a reigning king, §(4) the grant of the village was made in the name and under the signature of Jāīka himself, ‖(5) the colophon referred to Jāīka as the reigning donor and not Agguka, ¶(6) even the donee referred to Jāīka (Jayasena) as the grantor of the village. All this is self-evident and accepted by Dr. Aḷtekar as referred to in para 15 above. Thus the regency theory crashes. I think this corroborates sufficiently the view of M. M. Śāstrījī to which I fully subscribe. I therefore assign this charter A to Jāīka I who usurped the throne from his step-nephew Agguka II and call it Grant B.

22. Let us now turn to charter D and its details. These are Dr. Aḷtekar's remarks:— "Jāīka I died c. 849 A. D., leaving behind him two sons, Chāmuṇḍa-rāja and Agguka. Charters D, E, and F make it absolutely clear that the little Saindhava kingdom was further subdivided between these brothers on the death of Jāīka I. Rāṇaka, a grandson of Jāīka I, through his son Agguka, is seen to be issuing charter D in 555 G. E.; 12 years later, *i.e.*, in 567 G. E., another grandson of Jāīka I, named Agguka, through his son Chāmuṇḍarāja, is found to be giving charter E. In the genealogy of **charter F issued in 596 G. E. Agguka and Rāṇaka of charter D are altogether passed over; Jāīka I is stated to have been succeeded

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* परित्यज्य and कमलया निश्शंकमालिंगितो...

† श्रीजाईकः.....अनुबोधयति.....

‡ स समधिगताशेषमहाशद्धमहासामन्तश्रीजाईकः.....

§ यथा मया स्वभुज्यमानपच्छत्रीप्रादेशिकः.....and स्वहस्तोयं समधिगताशेषमहाशद्धमहा-सामन्तश्रीजाईकस्य राणकपुत्रस्य।

‖ श्रीजाईकेमलयशप्रसराप्तविश्वे.....स्वराज्यं भुञ्जति.....

¶ श्रीजयसेनो मह्यं ग्राममदात्.....

** See para 26 below.

by his son Chāmuṇḍarāja and the latter by his son Agguka III and this last by his son Jāika II. It is, therefore clear, that both the sons of Jāika I founded separate ruling houses." (P.194).

23. "Our charters do not make it clear as to which of the two sons of Jāika I was the elder one. It would however appear that Agguka was the younger one, as he and his son are passed over in the genealogy of charter F. In charter D Rāṇaka, the grantor, is stated to have been placed upon the throne by his father Agguka in his own lifetime. This may probably be due to Agguka's apprehension that his elder brother may resume the principality after his death." (P. 193 f).

24. "Since charter D of king Rāṇaka is issued in 555 G. E., it is possible to argue that there was no further subdivision of the Saindhava kingdom after the death of Jāika I. Rāṇaka the grantor of charter D, may bave been succeeded by his son Agguka, the grantor of charter E, some time before 567 G. E. As against this view it may be pointed out that Rāṇaka of charter D had a grown up son named Jāika, who was acting as Yuvarāja in 555 G. E. In the normal course of events, therefore, his succession could not have devolved upon his uncle. It is further to be noted that in charter E issued in 567 G. E. there is a statement made in 11.5-6 that the Saindhava family had at that time 'numerous branches and leaves,' *aparimita snigdhatara-patra-śākhā-sanchaya-śāli." (P.194).

25. "Members of all the three Saindhava houses are seen issuing their grants from Bhūtāmbilikā. Though there is some evidence of mutual jealousy, we do not find them fighting with one another. It would, therefore, appear that they were all staying at Bhūtāmbilikā, their ancestral capital, but ruling over different parts of their ancestral kingdom, more like members of a federation than as rulers of separate states. Our charters supply some evidence about the manner in which the ancestral territories were divided among the three branches, but it is very difficult to interpret. Charter C would show that the district of Pachchhatrī was under the senior-most branch of Kṛishṇarāja, while charter D would indicate that the district of Suvarṇamañjarī was allotted to the junior-most branch of Agguka. But charters B, E and F show that both the above districts were included in the kingdom of the branch founded by Jāika I." (P.194).

26. The issue here is whether Rāṇaka of charter D belonged to a subsidiary collateral branch or that Chāmuṇḍarāja appropriated the throne to himself after Rāṇaka. Dr. Altekar seems to have been lead by the genealogical order given in charter F and to justify that order he has to resort to the dubious theory of collateral lines. He has missed rather unwarily the omission by charter F of the successions of Kṛṣṇarāja and Agguka who had actually ruled before Jāika I. This means that charter F has given only the names of rulers having paternal ancestry and that there was another order of kings of the line which should have included all the rulers

* अपरिमितस्निग्धतरपत्रशाखासञ्चयशालि

who sat on the Saindhava Gādī. There is absolutely nothing in the texts of the charters D, E and F to show that there were two or more collateral branches of the Saindhavas ruling contemporaneously in individual capacity and that, too, from their ancestral capital city of Bhūtāmbilikā and as ornaments of the Western Surāṣtra and the lords of the Western Seas. May it be noted that all the grants are issued from Bhūtāmbilikā described as the erstwhile rival of the Gods' Amarāvatī or Alakā ; all grants claim their rulers to be fit for the adjectives *Saindhava-vaṁśa-śekhara (the head of the Saidhava dynasty) and †samadhigatā-śeṣa-mahā-śabda mahasāmanta ; all but the incomplete grant (plate A) declare that their grantors were ‡apara-surāṣtra-maṇḍala-maṇḍana and §apara-samudrādhipati :—showing thereby that each one of the grantor-rulers was the acknowledged head of the entire dominion—the Bhūtāmbilikā-centric western Surāṣtra. Thus there is absolutely no trace of any division of the kingdom in any of the six grants. The phrase aparimita-snigdhtara-patra-śākhā-sañcaya-śāli has nothing special about it but at the best it may be said to refer to those numerous blood relations that might have obviously multiplied during the long century covered by the grants, but certainly not to the vivisection of the territories of the realm.

27. For accepting the division of the kingdom into collateral branches in the light of the text of the grants we have to take so many issues for granted which cannot be substantiated. We have to presume for example that (1) the text of one charter presupposes the knowledge of the text of other charters that may have been issued later ; (2) Kṣemeśvarī the wife of Rāṇaka of charter C was connected with Kṣemarāja of the Cāvadās of Gujarāt for which we have no authority at all ; (3) something is hinted by way of double entendre otherwise used as simple poetic expression with reference to more than one ruler of the dynasty ; (4) Agguka of charter A who had a son named Rāṇaka continued to rule as a vassal of Jāīka I (making three Rāṇakas in all) ; (5) Jāīka I ruled as a regent and then as a king also (though charter F does not take any note of it in its genealogy) ; (6) Cāmuṇḍarāja was the elder because his brother and nephew were passed over by charter F ; (7) on the other hand ignore the similar case of Kṛṣṇarāja II where he the elder was passed over by the same charter F ; (8) Bhūtāmbilikā was the joint capital of all the branching families ; (9) the two districts of Pacchatrī and Suvarṇamañjarī were distributed promiscuously among the three branches ; (10) Patra (पत्र) and Śākhā (शाखा) meant the existence of actual collateral lines ruling from Bhūtāmbilikā in their own indvidual royal capacity.

28. Surely to take so many issues as granted before a case is established, cuts at the very root of that case itself. Charter F puts Cāmuṇḍarāja directly after

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* सैन्धववंशशेखर

† समधिगताशेषमहाशद्धमहासामन्त

‡ अपरसुराष्ट्रमंडलमंडन

§ अपरसमुद्राधिपति

Jāika I. But then it places Jāika I directly after Rāṇaka I where we definitely know that Kṛṣṇarāja II and Agguka II had preceded Jāika I. Agguka III and Cāmuṇḍarāja were the sons of Jāika I and I think inspite of Agguka III's especial anxiety, care and abdication* to secure for his son Rāṇaka II a safe Gādī against the possible machinations and malintention of Cāmuṇḍarāja which he might have suspected from his younger brother's behaviour known to him, history has been made to repeat its course by Cāmuṇḍarāja (the younger brother of Agguka III) who had a precedent to copy in the usurpation by coup-de-etat preferred by his father Jāika I. It seems Cāmuṇḍarāja awaited his opportunity for a similar coup-de-etat and seized the throne by outsting his nephew Rāṇaka II together with his son Jāika the Yuvarāja of charter D when the protective presence of the retired Agguka III was removed by his death in 555 G. E. With our knowledge of the family-feuds among the Saindhava rulers and the precedent recorded by charters A and B it is better to take the charters at their face-value and follow them straight way on without mincing their subject-matter this way or that.

29. So far as the charter F is concerned we know by its passing over of Kṛṣṇarāja II and Agguka II of charter A that it gives only the lineage from father to son. Other charters also follow the same scheme but restrict their lineage to three direct rulers connected as father and son. In charter A where Jāika I usurped the throne from his nephew he had to blame Kamalā for his misdeed to take his lineage to the fifth regnal predecessor Agguka I who was his grand-father *i.e.* only the third person from himself. This shows that the grants use two orders of heredity —regnal and paternal: charter A showing the regnal order from king to king, and the other charters giving only the paternal order from father to son where charter F is the chief guide.

30. It seems from the grants that the Apara Surāṣtra over which the Saindhavas ruled was divided into only two divisions viz. Pacchatrī which according to Dr. Altekar was given over to the seniormost branch and Suvarṇamañjarī which was assigned to the juniormost branch. But there is no indication of any other administrative district of the realm as the main branch also bestowed its grants of villages from these self-same two divisions. The fact therefore that all the grants are given in the form of villages situated in either one or the other division of the chiefdom namely Pacchatrī or Suvarṇamanjarī, shows that the territories were not divided piece-meal between the "numerous branches and leaves". All the grants are given by the supreme ruler from one of these two divisions of his dominion "as enjoyed by me". This shows that the given villages belonged to the lands of the overlord of the whole kingdom and not to the fief of a branching principality.

* यश्च जीवतैव पित्रा.....मंगलकलशेन स्वपाणिनाभिषिच्य सिंहासनमधिरोपितः

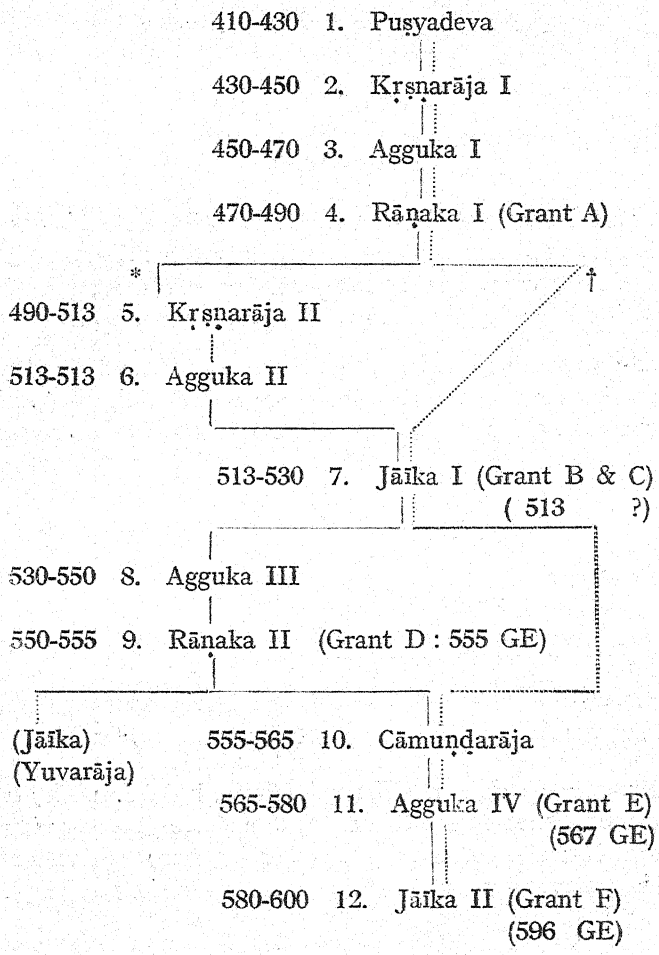
31. In the light of my these observations I believe that the grants under discussion were issued by the supreme rulers of Apara Surāṣtra Maṇḍala, who had their capital at Bhūtāmbilikā and that no question of branch line at all arises.

32. I give my order and details of the grants as under :—

Grant No.	A	B ? 513=812 AD	C	D GE 555=834AD	E GE 567=886-AD	F GE 596=915 AD
1						Puṣyadeva
2	Kṛṣṇarāja I					Kṛṣṇarāja I
3	Agguka I	Agguka I	Agguka I			Agguka I
4	*Rāṇaka I	Rāṇaka I	Rāṇaka I			Rāṇaka I
5		Kṛṣṇarāja II				
6		Agguka II				
7		*Jāīka I	*Jāīka I	Jāīka I	Jāīka I	Jāīka I
8				Agguka III		
9				*Rāṇaka II		
10				(Jāīka) (Yuvarāja)	Cāmuṇḍa-rāja	Cāmuṇḍa-rāja
11					*Agguka IV	Agguka IV
12						*Jāīka II
Division of grant village	Pacchatrī	Pacchatrī	Pacchatrī	Suvarṇa-mañjarī	Suvarṇa-mañjarī	Suvarṇa-mañjarī

* Donors of the grants.

33. The genealogical tree will be like this: *Saindhava Dynasty: c.* 400 *to* 600 *G. E.*



34. In these two tables each grantor is a supreme overlord. He issues his royal favour from Bhūtāmbilikā. He is the head of the Saindhava ruling family. He is the jewel of the western Surāṣtra. He is the lord of the western seas. He bestows his grant-in-village either from Pacchatrī or Suvarṇamañjarī division belonging to himself. He gives his lineage from king to king (twelve kings) as in grant B or from father to son (eight kings) as in other grants—grant F giving the full pedigree.

35. I think this clearly traces the genealogy to twelve successive rulers in all and debars any question of collateral branches ruling from the same capital.

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* ——shows regnal order from king to king.

† .....shows paternal order from father to son.

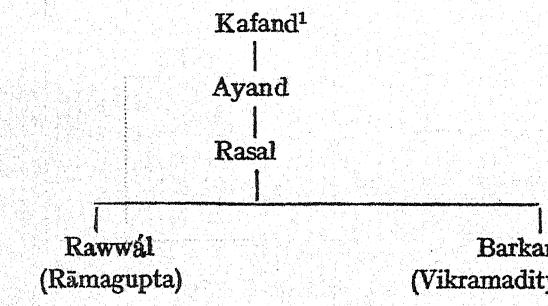
ALEXANDER AND THE GUPTAS

By

D. R. MANKAD

As a result of my Puranic studies I have come to the conclusion that the contemporary of Alexander was not Chandragupta Maurya, but Chandragupta I of the Gupta Dynasty. Here, I wish to write a very brief note, without going into details, about a piece of evidence which vindicates the position taken up by me.

Scholars have now practically agreed that the story of Rawwál and Barkamaris, given in Majmal-ul-Tawárikh refers to Rāmagupta and Chandragupta II Vikramāditya. Now, in that story, the genealogy of Barkamaris is given as under :



Now, this story very clearly says (History of India, Elliot I, p. 108) that Kafand was a contemporary of Alexander the Great. In the above genealogy Chandragupta II is removed from Kafand, *i.e.*, from Alexander by three generations. That is Chandragupta II is removed from 325 B.C. by three generations and I put Chandragupta II in *c.* 247-5 B.C.

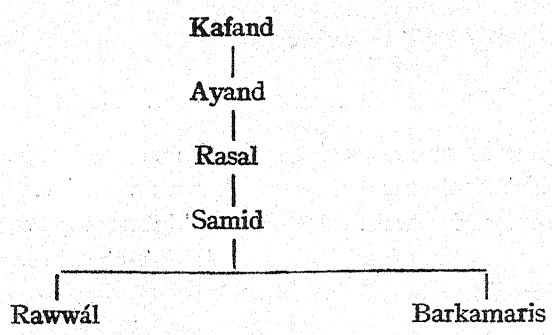
But it may be urged that there are some points in this story, which do not tally with the Gupta history. For instance, it may be said that this story gives 3 ancestors of Chandragupta II, while the Gupta inscriptions give four ancestors to Chandragupta II. Then again the life-incidents of Kafand are not such as are likely to have happened in the life of Śrī Gupta, the founder of the Gupta line. I shall answer these objections, though I shall not enter into details here. I think that as in other bardic stories, so here also, exploits of one king are ascribed to another king. Such transpositions are not unknown to bardic stories. I, therefore, suggest as under :

(1) The life-incidents of Kafand and Samid (who are said to be brothers) should refer to Rasal and Samid.

(2) Samid, who is taken as a brother of Kafand in the story, should be taken as the son of Rasal.

1. A brother of Kafand is named as Samid in the story.

With these changes, the genealogy will stand thus:



In this case, we can equate Samid with Samudra (Gupta), Rasal with Chandragupta I, Ayand with Ghatotkaca and Kafand with Gupta. And this will be faithful to the Gupta genealogy as given in their inscriptions. Kafand may equate with Gupta thus:—Gupta—Gupat—Gufat—Kafad—Kafand. In Shahnamah, the variant for Kafand is given as Kaid, which may equate with Gutta, the Prakrit form of Gupta. The mistake in the story is that the life-incidents of Rasal and Samid (who were father and son) are transferred to Kafand and Samid (and they are made brothers). Such transpositions are seen in bardic accounts.[2] If, therefore, we take the life-incidents of Kafand and Samid to refer to Rasal and Samid, they will tally well with the lives of Chandragupta I and Samudragupta.

The important point, however, to be remembered is that the story expressly calls Kafand, and if we accept my suggestion then Rasal (= Ch. I) to have been contemporary of Alexander. Barkamaris, whom our modern scholars equate with Chandragupta II Vikramāditya, is removed only by three degrees from Kafand. Therefore, the evidence of this story almost conclusively proves that the Guptas started their career immediately after Alexander and that is exactly what I have found from the Puranic evidence.

2. The reason for this transposition may be this. These incidents belongd to the lives of Chandragupta I and Samudragupta, who were the first two Gupta emperors. But the genealogy showed Gupta (Kafand) to be the first of the Guptas. This was probably responsible for the transposition.

REVIEWS

THE VIKRAMADITYA—PROBLEM—A FRESH APPROACH. BY PROF. K. B. VYAS.

Vikramaditya—a great apostle of truth and justice among Hindu kings during first century, is a great historical figure who requires more attention. Very recently the bi-millennial anniversary of Vikram was celebrated in many parts of India and on this occasion it was but proper to institute an inquiry into the history of the life of Vikramaditya, his works and age.

The History of India reveals that several kings in ancient India have assumed the proud title of Vikramaditya, namely, Chandragupta II, Skandagupta, Vikramaditya Harsha of Malwa and others; but none of them have been cherished by popular memory as Sakari Vikrama who is still remembered as a saviour of Bharatavarsa from bruteless Saka barbarities.

Many theories have been propounded by distinguished Scholars and Schools of India and Europe about Vikramaditya but the main controversial hypothesis postulated by eminent Scholars is of Chandragupta II, who assumed the proud title of Vikramaditya and that of the Vikramaditya considered on the authenticity of legends like Kathasaritsagar, Rajatarangini and Brahatkatha Manjari and many Jain Prabhandhas.

The present pamphlet is confined to his concluding comments on all theories put forth by the various Scholars of India and Europe; like Dr. Bhandarkar, Yunan Chwang and others. Prof. Vyas has placed before us his views about the controversial hypothesis stated above, about Krata and also about the life of Vikramaditya that we find in legends and Prabhandhas. One thing is certain and that is, even Prof. Vyas is not able to clarify who is that Vikramaditya who saved Bharatavarsa from Saka's invasions and who is a great patron of learning, culture and religion and on whose name an era known as "Vikramasamvata" started.

This pamphlet is divided in to ten sections. The first four of which are devoted to his concluding comments on propounded theories about Vikramaditya. The fifth one is for Krata and the last five sections are for the general history of Vikramaditya, his works and life.

The whole approach is a well studied and systematic one. In reading this, we get the complete grasp of Vikramaditya, his age and also about his multifarious activities and scholastic learnings. This pamphlet is also an inspiring directive to the future scholars and students to proceed with the further study of Vikramaditya problem.

JANARDAN PANDYA

THE AHIRS OF KHANDESH AND THEIR LANGUAGE:

An interesting paper bearing the above caption from the pen of Prof. K. P. Kulkarni has appeared in the Journal of the Anthropological Society of Bombay, New Series, Vol. II, pp. 47-68, the first part of which (pp. 47-53) deals with the Ahirs and their ethnological and historical account and the latter (pp. 53-68) deals with the language of the Ahirs in particular and of Khandesh in general. In the first part the learned writer has put the various theories regarding the origin of the Ahirs and their entry and settlements in India. The authoritative views are so conflicting on these points that nothing strikingly definite emerges from the discussion. Fortunately, "the assimilation" as the writer says (and we whole-heartedly agree with him) is so perfect that it is impossible to distinguish an Ahir from a non-Ahir". The story of their origin, therefore, loses much of its practical value.

Coming to the latter half, the writer gives a comparative study of the Ahirani specimens selected by him by personally going to the place and hearing the speakers in their natural surroundings. The equivalent Marathi and Gujarati sentences and idioms are subjoined to facilitate comparison. A story, a piece of conversation, some poetic passages and such materials are adduced, and, later analysed grammatically from the phonetic, morphological, syntactical and vocabulary points of view. Space does not allow him to treat phonology in detail. Regarding the grammatical forms, the so-called 'case-terminations' are given; but no noun is declined fully; nor are the various types of nouns existing in the language are mentioned. Regarding the verbs, the verb 'to do' is declined in the present, past, future and continuous present. A few "inaccuracies" of the Linguistic Survey are mentioned. Lastly, by the method of simple enumeration of the Nominative, Accusative Instrumental, Dative, Ablative, Genitive and Locative forms the writer decides by the method of proportion, that the "Ahirani has more affinities with Marathi than with Gujarati Language and is more a dialect of Marathi than of Gujarati."

The learned writer has consulted all the previous literature on the subject, has collected specimens from 80 persons of different places and has stayed with the people for some time. He says he has "an unbiassed mind" and has "linguistic interest." His treatise on Marathi language is a well known specimen of his deep study, industrious research and capacity for marshalling facts. But in this particular paper he seems to have treated the subject rather superficially and hurriedly. Perhaps he is aware of this fact, as more than once he has stated in the paper, that for want of space he has not been able to give the proper seriousness to the question which it deserves.

The fact appears to be that at present this question has not merely 'linguistic interest' as it used to have in the past (say, in the times of Sir George Grierson). After getting independence, the talk of reconstruction of provinces on linguistic basis is in the air. The regional Universities of Poona and Gujarat are to come very

shortly and the bill for the former has already become an Act. Every Province is trying to extend its boundary as far as possible and discussions on the question are very common in Press. The question of Khandeshi has thus gained political importance analogous in a sense to the questions of Junagadh and Kashmir. Every Province wants to score some "Peaceful victories" by adding new areas to itself. Though Gujarat has not yet seriously taken to this sort of work, Maharashtra, with the characteristic foresight, has started it much earlier. Attempts have been made to make Konkani a dialect of Marathi; Bombay is claimed to be in Maharashtra; and Khandesh comes next. Years ago, Marathi Sahitya Parishad had appointed a Committee of some learned persons of Maharashtra to settle the matter of Khandesh; and in its report which was published at that time, it was unanimously declared that Khandeshi was a dialect of Marathi. We are glad to know that Prof. Kulkarni, a genuine linguist, has not used so much boldness. As a matter of fact, he has put forth his conclusions like a true scholar, with 'a feeling of tremour' as he knows that by doing so he bends his bow against 'learned scholars and eminent polyglots of the world'.

Thus bias is bound to creep in, consciously or unconsciously in many ways. The selection of localities and men, the selection of material of speech, the comparison with languages not fully known to the worker and many other commissions and omissions are fruitful source of bias. The method itself may be faulty; for example, the method of simple enumeration of words, forms, etc. will, it is well known, give a faulty result. In a place like Khandesh where superimpositions and interpenetrations of languages have occurred, it requires delicate and skilful handling of the material in lay bare layers after layers. The superficial coating of Modern Khandeshi is that of Marathi, because under British rule Khandesh was made, for administrative convenience, a part of Maharashtra. Marathi was consequently made the school-and-court language. The officers who came to Khandesh spoke Marathi. The native language, therefore, suffered in growth although it continued to live in trade and commerce and as a general medium in the Kunbis or the Ahirs and others. As soon as this cover is removed, one clearly sees true Khandeshi, the descendant of Sauraseni Prakrit, Nagara Apabhramsa and Proto-Rajasthani Gujarati-Malvi-Bhili language; and, like Surti, a mere dialect of Modern Gujarati. If Marathi is a descendant of the Maharashtri Prakrta which bifurcated from Saurasena Prakrta earlier than even the Apabhramsa stage, how can Khandeshi, a descendant of Sauraseni Prakrta and Saurasena Apabhramsa be a dialect of Marathi? (Prof. Kulkarni has used the term Apabhramsa in a rather loose sense). Had Prof. Kulkarni compared Khandeshi with Malvi, Bhili and Rajasthani dialects also instead of remaining content with comparisons with Marathi and Gujarati, he would have easily seen that Khandeshi belongs to the great Rajasthani block of which Marwari, Gujarati, Malvi, Bhili are only parts. The mistake of the writer of the Gazetteer has been boldly and emphatically corrected by Sir George, one of the greatest linguists of Indo-Aryan languages and a few inaccuracies in recording words or forms even if they are

genuine, cannot materially alter the conclusion which he has come to after great deliberation and thought. For here are his words:

"Among the dialects spoken within the territory sketched above there is one, *viz.*, Khandeshi, which has hitherto been classed as a form of Marathi. The ensuing pages will, however, show, on the one side that the so-called Bhili dialects gradually merge into the language of Khandeshi; on the other that *Khandeshi itself is not a Marathi dialect.* Several suffixes, it is true, are identical with those used in Marathi. But most suffixes and the *inner form of the language* more closely agree with Gujarati and Rajasthani."

"T"

FOUNDATION AND OUTLINE OF WORLD-CULTURE, BY RAO BAHADUR P. C. DIVANJI, M.A., LL.B. BOMBAY, 1948.

In his presidential address as the President of the Indian Philosophy Section of the Indian Philosophical Congress held at Trivandrum in December 1945, Rao Bahadur Divanji propounded the claims of the Indian standpoint to dominate the world culture on the basis of its own inherent merit. The idea is further developed here, and Shri Divanji describes his picture of world culture based on non-violence (ahimsa). His new religion will have no idols, no temples or churches, no priests and special scriptures except the books of knowledge and wisdom, and rules of conduct in private and public life, approved by the nations popular assemblies. Let us hope that this new non-institutional world-religion will bring peace, prosperity and happiness to the increasing human population on this unhappy world.

સમૂળી ક્રાન્તિ. શ્રી. કિશોરલાલ મશરૂવાલા. નવજીવન પ્રકાશન મંદિર. અમદાવાદ પૃ. ૧૬૪. રૂ. ૧॥.

પૂજ્ય ગાંધીજીના અવસાન પછી ગુજરાતીમાં લેખક તરીકે તેમનું સ્થાન કોણ લઈ શકે એમ હોય તો તે શ્રી. કિશોરલાલ ભાઈજ છે, એ એમણે હરિજન-પત્ર-સમૂહના અધિપતિ તરીકે સિદ્ધ કરી આપ્યું છે. તેમના "ગીતામંથન" અને "જીવનશોધન" એ પુસ્તકો તેમને ગુજરાતી તત્વચિંતકોની પ્રથમ કક્ષામાં મૂકે છે. તેમના વિવિધ વાંચન અને સ્વતંત્ર વિચાર-શક્તિથી તેમણે શ્રી. આનંદશંકર ભાઈની ખોટ ગુજરાતને કેટલાએક અંશે પુરી પાડી આપી છે. એમણે ગાંધીજીના આશ્રમમાં અનેક વર્ષો સુધી રચનાત્મક કાર્ય કરીને તેમની સાથે વિચાર વિનિમયનો લાભ લઈને, દેશના વિચારકોમાં અગ્રસ્થાન પ્રાપ્ત કર્યું છે. એમનું શાન્ત નિઃસ્પૃહી જીવન, તીવ્રબુદ્ધિ, અને અથાગ પરિશ્રમ લેવાની શક્તિ એ ગુણોની પ્રતિભાથી તેમણે પોતાનું જીવન ઉજ્જ્વળ કર્યું છે. શ્રી. ગોવર્ધનરામના "સાક્ષરજીવનના" સાચા ઉપાસક એમના જેવા ગુજરાતમાં કોઈ મળી આવશે નહીં.

આ પુસ્તકની લગભગ સાથે, એટલે થોડા એક અઠવાડીઆ પછી, તેમનું "સંસાર અને ધર્મ" પ્રસિદ્ધ થયું છે. તેમાં જૂના લેખો નાના મોટા ફેરફારો સાથે જોવામાં આવે અને તેમાં અનેક વર્ષોના વિચારોનું સંકલન કરવામાં આવ્યું છે. પરંતુ "સમૂળી ક્રાન્તિ" તો

તેમની સકળ વિચારસૃષ્ટિનું સુંદર અને સુરેખ પ્રતિબિંબ છે. વળી લગભગ એકજ સળંગ બેઠકમાં–ફક્ત પાંચ મહિનાના ગાળામાં–લખાયેલું હોવાથી તેમાં કર્તાએ પોતાના સઘળા સિદ્ધાન્તોનું ટુંકાણમાં અને સરળ રીતે પ્રતિપાદન કર્યું છે. લગભગ પંદરમી ઑગસ્ટ ૧૯૪૭ ના સ્વરાજ્ય દિન અને ૩૦ મી જાનેવારી ૧૯૪૮ ના ગાંધીજીના જોઝારા હત્યાદિનના સમયના રોમાંચપ્રેરક દિવસોમાં લખાયેલું આ પુસ્તક અનેક રીતે શ્રી. કિશોરલાલ ભાઇની ઉત્તમ કૃતિ છે, જો કે હજુ પણ આપણે તેમની પાસેથી ઘણા ઉત્તમોત્તમ ગ્રંથોની આશા રાખીએ છીએ.

ક્રાન્તિના ઉપાસકોને આ પુસ્તક મોળું લાગશે. "આપણા લોહીમાંથી જ્ઞાતિભાવનાનો સંસ્કાર અને સમાજમાંથી જ્ઞાતિસંસ્થા નાબુદ કરવાની, અને સમગ્ર હિંદી જનતા પોતાને એક અને સમાન માનવજાતિ માનતી થાય અને તેવી રીતે વ્યવહાર કરતી થાય એવી ક્રાન્તિ નિર્માણ કરવાની" તેમની ધગશ બહુ ટકતી નથી. બૌદ્ધ અને શીખ ધર્મનો ઇતિહાસ સૂચવીને તેમનો નિર્ણય સ્પષ્ટછે કે "જ્ઞાતિભાવના વિરહિત સમાજ સ્થાપી નહીંજ શકાય." "આજની જ્ઞાતિઓ તોડી નવી જ્ઞાતિઓ રચવાનું ભલે કહો. પણ હિંદુ સમાજ કોઇને કોઇ પ્રકારનાં જ્ઞાતિતંત્ર રાખીનેજ રહેવાનો એમ સમજી રાખવું." હિંદમાં જ્ઞાતિતંત્ર હિંદુઓમાં, ખ્રીસ્તીઓમાં, મુસ્લીમોમાં શું કરી રહ્યું છે તેનો ઇતિહાસ જાણનારાને સેન્સસ રિપોર્ટમાંથી જ્ઞાતિતંત્રના બાહ્ય ચિહ્નોને નાબુદ કરવાના ઠરાવો થાય કે એકટ પસાર થાય તે વ્યર્થ લાગે છે.

તે છતાં કિશોરલાલ ભાઇની વિચારસૃષ્ટિ ધર્મ અને સમાજના વિષયમાં આર્થિક ક્રાન્તિના વિષયમાં, રાજકીય ક્રાન્તિ તેમજ કેળવણીના વિષયોમાં મૌલિક તત્વોને ઘણી સુંદર રીતે સમજાવે છે. આખું પુસ્તક વાંચી જવા દરેક વાચકને આગ્રહ છે. તેમની મૌલિકતા અને મૂળગામી વિચારોની એક નાની યાદી આ વાચનને પ્રેરે એમ ધારીને આપવામાં આવી છે:—

"આપણે એવી ક્રાન્તિ કરીએ કે જેમાં પદે પદે આપણી માનવતા દેખાય અને ખીલે અને સમગ્ર માનવજાતિને તે પંથે વાળે. એજ સાચી સમાજરચના, અર્થરચના, અને રાજ્યપ્રણાલિકા છે."

"એક સર્વવ્યાપક, સર્વનિયંતા પરમેશ્વર સિવાય બીજા સર્વ દેવદેવતા, ગ્રહ, પિતૃ અવતાર, ગુરૂ વગેરે કે તેની પ્રતિમા, કે પ્રતિકની ઉપાસના–પૂજા–મંદિરસ્થાપના–વગેરેનો નિષેધ."

"કોઇપણ શાસ્ત્ર–વેદ, ગીતા કુરાન કે બાઇબલ–ઇશ્વરપ્રણીત કે ઇશ્વરવાણી નથી.

"કોઇ મનુષ્યને પરમેશ્વર કે પેગંબરની કોટીમાં મૂકવો નહીં.

"સમાજનું આર્થિકરચના અને રાજ્યનીતિનું અંતિમ લક્ષ્ય પ્રજાને નિરલસ નિરોગી અને પવીત્ર જીવતરવાળા બનવાને અનુકુળતા કરી આપવાનું હોવું જોઇએ. એ ગુણોને પોષક નિયમો સંસ્થાઓ અને સંજોગો નિર્માણ કરવા, અને લગતાં સત્યોને ખોળવા એજ સર્વે પ્રવૃત્તિઓનું ધ્યેય હોવું જોઇએ."

આર્થિક ક્રાન્તિના વિષયમાં તેમના વિચારો ખરેખર ક્રાન્તિકારક છે:–"વ્યાજ જેવી વસ્તુ ન હોવી, બલકે તેથી ઉલટી કપાત હોવી જોઇએ." "અમુક આવક તથા મૂડીવાલા

પર કર વગેરેના બંધન ન હોય; અને તેના ઉપરની મર્યાદા કરતાં વધારે આવક તથા મૂડી રાખી શકાય નહીં" "અમુક પદાર્થો વપરાશમાં ઘસાય નહીં તેની કિંમત ઓછી આંકવી જોઇએ અને તેનું સ્વામિત્વ મજીઆરૂંજ હોય અને તે મજીયારાપણું કુટુંબ, ગામ, જીલ્લો, દેશ કે જગતમાં ઘટતી રીતે વહેંચાયેલું હોય."

"રૂપીઆ એ સોના કે ચાંદીનું પ્રમાણપત્ર નહીં પણ અમુક વજન ધાન્યના દ્યોતક ગ્રેન-શેર કે તોલો અનાજ એ રીતે નક્કી થવું જોઇએ.

"નોટ કે સિક્કા પાછળ રહેલા નિશ્ચિત ધાન્યદ્વારા દેવડ કરવાનો અધિકાર ધાન્યના માલિકને હોવો જોઇએ."

"જડ જાહોજલાલી કરતાં માણસાઇને સૌથી વધારે મહત્વ અને જીવ માટે સૌથી વધારે આદર આપતાં શીખવાની જરૂર છે.

શ્રી. મેહર જવાંમર્દ ભાગ ૩ જો. સંપાદક કેશવલાલ માલદેવ રાણાભાઇ (વાનપ્રસ્થી) પોરબંદર મહેર વિદ્યાર્થીભવન રૂ. ૨-૮-૦ પૃ. ૨૫૪.

શ્રી. માલદેવજી રાણાભાઇ મહેરજાતિના અગ્રગણ્ય સામાજીક કાર્યકર છે. "હું મહેર-જાતિમાં જન્મ્યો છું તો તેની ઉન્નતિ સાધવી, અને તે સાધવા માટે તે જાતીનો ઇતિહાસ મેળવવો એ મારી ફરજ છે"—એ એમનું જીવનધ્યેય સમજીને શ્રી. માલદેવજીએ મહેરજાતિ વિષે ત્રણ પુસ્તકો તૈયાર કર્યા છે અને તેમાં પોતાનાથી બનતી ઇતિહાસ સામગ્રી ઘણી દિશાઓમાંથી સંગ્રહી છે. આ સામગ્રી ભેગી કરવામાં જોઇએ તેટલી વિવેચક બુદ્ધિ ન વપરાઇ હોય અને કેવળ ઐતિહાસિક સત્ય જાણવાને માટે પ્રયાસ કરવામાં ન આવ્યો હોય તોપણ માલદેવજીભાઇએ ઘણી ઉપયોગી સામગ્રી ભેગી કરી છે. તેને માટે મહેરજાતિ ઉપરાંત જાતિ-કુલોના અભ્યાસીઓ—કુલવેત્તાઓ—તેમનો જેટલો ઉપકાર માને તેટલો ઓછો છે. "મહેરજાતિના જવાંમર્દો" એટલે મહેરજાતિના વીરપુરૂષો અને ભકત પુરૂષોનો ઇતિહાસ, લગભગ ૩૫૦૦૦ જેટલી સંખ્યાની એક જાતિ અભણ હોવા છતાં પણ ભૂતકાળના ઇતિહાસ અને વીરોના ચારિત્ર્ય ઉપર આધાર રાખીને પોતાની ઉન્નતિ કેવી રીતે સાધે છે તે પણ સારી રીતે બતાવ્યું છે.

મહેરજાતિનો મુખ્ય વસવાટ પોરબંદર, જૂનાગઢ અને જામનગરની હદમાં છે. સશકત સુબદ્ધ, અને રૂપાળી મહેરજાતિ અત્યારે તો મુખ્ય કરીને ખેતીનું કામ કરે છે. પરંતુ ભૂતકાળમાં તેમના બાહુબળનો ઉપયોગ ઘણા યુધ્ધોમાં થયો હતો અને એક મત પ્રમાણે તો વલ્લભીના મૈત્રકો અને આ મહેરો એકજ જાતિના છે. મહેરોએ તેમના જૂના રીતરિવાજો સારી રીતે જાળવી રાખ્યા છે. સાધારણ રીતે મહેરો સૂર્યપૂજક ગણાય છે પરંતુ પૃ. ૭૨ ઉપર આવેલા મહેરોના ઇષ્ટદેવ અને કુળદેવીની નામાવળીમાં રામચંદ્રજી, હનુમાનજી, ગોરખનાથ, અને ખોડીઆર માતા, ચામુંડામાતા, વિંધ્યવાસિનિ, આશાપુરી વગેરે માતાઓના નામો છે. મહેરોના પહેરવેશ તેની ભાષા તેમના સ્ત્રી પુરૂષોના નામો, વગેરે ઘણી માહિતી શ્રી. માલદેવભાઇએ સંગ્રહી છે. તેને માટે તેમને અનેક ધન્યવાદ ઘટે છે.

ગુજરાત સંશોધન મંડળે મનુષ્યમાપનવિદ્યાની મદદથી મહાગુજરાતની ઘણી જાતિઓનો અભ્યાસ શરૂ કર્યો છે. તેમાં મહેરજાતિની લાક્ષણિકતાને લીધે તેમનાં સ્ત્રીપુરૂષોનાં માપ લેવામાં

આવ્યા છેઃ તે સંશોધનનો અહેવાલ બહાર હજુ પાડી શકાયો નથી પરંતુ તેની ગણુત્રી અને આંકડા પ્રમાણે આ મહેરોની લાક્ષણિકતા સિદ્ધ થાય છે. તેઓ કોળી, ભીલો, અને ભંગીની જાતિઓથી જૂદા પડે છેઃ અને તેમનો જાતિસંબંધ, મીયાણાં, વાઘેર, લુહાણા, ખોજા, અને રબારી જેવી સશક્ત જાતિઓ સાથે વધારે પ્રમાણમાં આવે છે. મહેરોની સંસ્કૃતિ, તેમની જીવનચર્યા, તેમનું લોકસાહિત્ય, તેમનું લોકજીવન, એ બધાનો અભ્યાસ પણ વધુ શાસ્ત્રીય રીતે થાય તેને માટે તૈયારી થાય છે.

વકતા કેમ થવાય? સતીશચંદ્ર પ્રતાપરાય દેસાઇ. પ્રિન્સિપાલ, બોમ્બે ટયુટોરીઅલ કોલેજ. ચોપાતીયા. મુંબઇ. ૧.

"વકતા કેમ થવાય" તે વિષયમાં શ્રી. સતીશભાઇએ થોડું એક સંશોધન કર્યું છે, અને તેની સફળતા માટે તેમણે જણાવ્યું છે કે તેમના પુસ્તકમાં લખેલા સિદ્ધાંતોનો પ્રયોગ એક ઉંચા સરકારી હરજ્જે ધરાવતી વ્યકિતને વકતૃત્વકળા શીખવવામાં કરવામાં આવ્યો હતો અને તેઓ થોડા વખતમાં સરસ વકતા થયા હતા. સંશોધકોને પણ આવી કળાની જરૂર છે, નહીં તો તેમના કાર્યની કદર કોઇ કરતું નથી. આ પુસ્તક ઉપયોગી છે.

કલાકારની સંસ્કારયાત્રા. શ્રી. રવિશંકર રાવળના જાપાન, ઉત્તરભારત તથા કુલુના કલા પ્રવાસો, સંખ્યાબંધ ફોટોગ્રાફો, સ્કેચો, ચિત્રો અને નકશા સાથે. પૃ. ૩૪૦. રૂ. ૪–૧૨–૦.

ગુજરાતી ભાષામાં પ્રવાસવર્ણનો ઘણા ઓછાં છે. કલાપીનો "કાશ્મીરનો પ્રવાસ" અને કાકા કાલેલકરનો "હિમાલયનો પ્રવાસ" એ સમર્થ શબ્દચિત્રો જૂદીજ ધાટીમાં લખાયેલાં પુસ્તકો છે. રવિભાઇ જૂદીજ જાતના સમર્થ કલાકાર છે. "ચિત્રકૂટ"માં ચિત્રો અને ચિત્રકારોથી સતત વિટાએલા રહેલા હોવા છતાં પણ એમની લેખન શૈલી અને વર્ણનપદ્ધતિ અત્યંત સરળ અને આકર્ષક રહ્યાં છે. કુમારમાં આ પ્રવાસવર્ણનો છપાયાં ત્યારે તેને માટે અનેક કુમારો અને પ્રૌઢ વાચકો દર માસે ઉત્કંઠ રહેતા, અને આ શબ્દચિત્રો અમરરૂપ પામતાં હજુ પણ દરેક પ્રકારના ગુજરાતી વાચકને પ્રવાસવાચન, અને ચિત્રસૃષ્ટિ માટે અનહદ પ્રેમ ઉપજાવશે એમાં શંકા નથી.

રવિભાઇની દેહયષ્ટિ સુકલકડી ગણાય પણ તેમનું હૃદય રસભીનું, સંસ્કારસમૃદ્ધ અને ઉર્મિલ છે. સુંદરતાના એ પૂજક છે તેને શોધવામાં અને તેનું વર્ણન કરવામાં જીવનનો મહાનંદ અનુભવે છે. હાસ્યરસના પણ એ શોખીન છે અને તેમનું મર્મિલ હાસ્યવર્ણન આ પુસ્તકને ઘણે ઠેકાણે આકર્ષક બનાવે છે. તે એક કલાકાર છે એટલું જ નહીં પણ અર્વાચીન સમયની અનેકવિધ પ્રગતિમાં રસ લે છે. તેથી તેમનો જાપાનનો પ્રવાસ અને શ્રી. રોરીકની કર્મભૂમિ કુલુપ્રદેશનો પ્રવાસ ઘણોજ રસમય કરવામાં તેમની "અર્વાચીનતા" ઘણી ઉપયોગી થઇ પડે છે. રવિભાઇ પાસેથી હજુ વધારે મૌલિક કલાચિંતનના નવા પુસ્તકોની આપણે આશા રાખીશું.

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કુમાર, વર્ષ ૨૫, અંક ૧૦ અને ૧૧. પૂર્ણા, પુસ્તક ૩, અંક ૨, ૩ અને ૪.

પુસ્તકાલય, પુસ્તક ૨૨, અંક ૩, ૪. જય ગુજરાત દીપોત્સવી અંક.

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